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10th Anniversary
Covenant of Mayors
for Climate & Energy
Eastern Partnership

Covenant of Mayors for Climate & Energy – Eastern Partnership

Municipal solar PV power plant in Artik community

10th anniversary of the Covenant of Mayors in the Eastern Partnership Region
HIGH-LEVEL CONFERENCE, 29-30 NOVEMBER 2022, Tbilisi (Georgia)

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BACKGROUND OVERVIEW

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- The Government of Armenia ratified the **Paris Agreement** of the UN Framework Convention on Climate Change in **February 2017**. Therefore, reducing greenhouse gases emissions is a priority agenda.
- Local communities committed to make transformational changes toward green and sustainable city concept by adopting their **Sustainable Energy Action Plan (SEAP)**.
- In 2017, there have been 17 signatories of Covenant of Mayors in Armenia.
- INDC submitted in 2015 and updated in 2021.

BARRIERS

- Municipal budget constraints
- Limited borrowing capacity
- Lack of tailor-made financing instruments
- Lack of sovereign guarantees
- Slow local economic activity
- Limited subsidies
- No opportunities for third party financing (ESCO/EPC), etc.

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EU4ASEP IN BRIEF

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- **THE PROPOSED SOLUTION:** Develop an alternative financing mechanism and a business model that will demonstrate the potentials (also the risks) of sustainable energy investments for communities of Armenia. Whereas, the lessons learned will catalyze and accelerate such investments in other communities.
  - Beneficiary communities: Artik (Shirak province), Aparan (Aragatsotn province)
  - Grant awarded: 28 December 2017
  - Effective Start Date: 01 March 2018
  - End date: 30 April 2022 (extended twice, 15 months total; COVID-19, Martial Law, Financing delays)
  - Grant financing from EU: 80%
  - Co-financing from cities: 20%

ENERGYSAVING FOUNDATION

EU4ASEP: THE THEORY OF CHANGE

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- **Overall objective (Impact):** Development of a viable model for Community-Lead Renewable Energy Generation and Sustainable Energy Transformation
  - **Specific objective - Outcome 1:** Increase the energy security and sustainability, reduce the carbon footprint, use sustainable energy solutions for systematic transformation towards a green city paradigm **[Op.4. Set of documents on COMO Fund]**
  - **Specific objective - Outcome 2:** In Artik: Production of solar electricity and feeding into utility grids at green tariffs, coupled with private sector participation and implementation of massive outreach campaign and capacity building. **[Op.1. 0.6 MWp solar PV plant in Artik]**
  - **Specific objective - Outcome 3:** In Aparan: integration of solar rooftop PV with net metering connection with the grid **[Op.2. 25 kW roof top solar net-metering]**
  - **Specific objective - Outcome 4:** Development of comprehensive logistical, organizational and financial engineering of the RE investments, which built in financial viability, generation of revenues to the community budget, and possibilities of private sector participation **[Op.3. Set of documents for business model]**
  - **Specific objective - Outcome 5:** Capacity building of the municipal officials, community members, business sector and residents to promote behavioral changes in EE and RE, better energy management and publicity of the achieved results through trainings, seminars, sustainable energy days/weeks, and business fora. **[Op.5. Public awareness and capacity building]**

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EU4ASEP: ACTIVITIES & OUTCOMES

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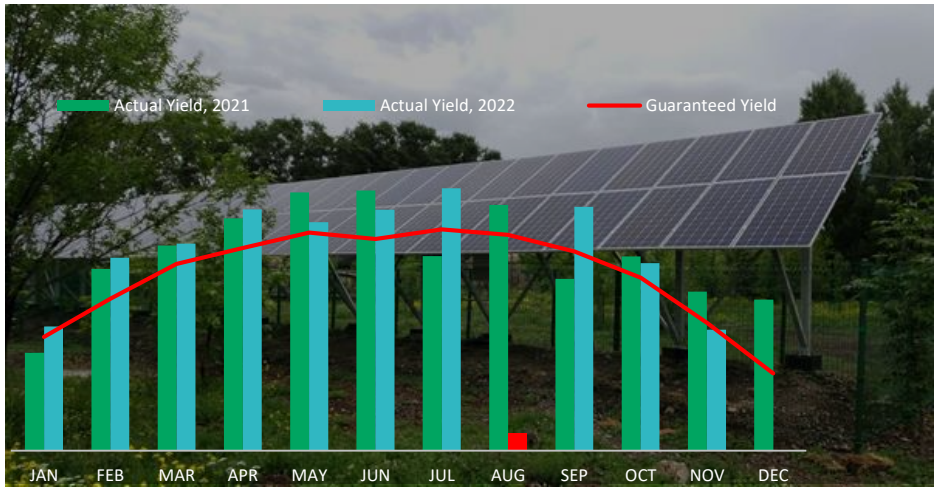
Activity 1 - Develop business models for implementation of the investment projects in communities (Op.3) / APARAN

- Business model
- Legal docs & permits
- Procurement package
- O&M manual
- Extra-budgetary RF
- Design & build contract
- Tech supervision
- Awareness events

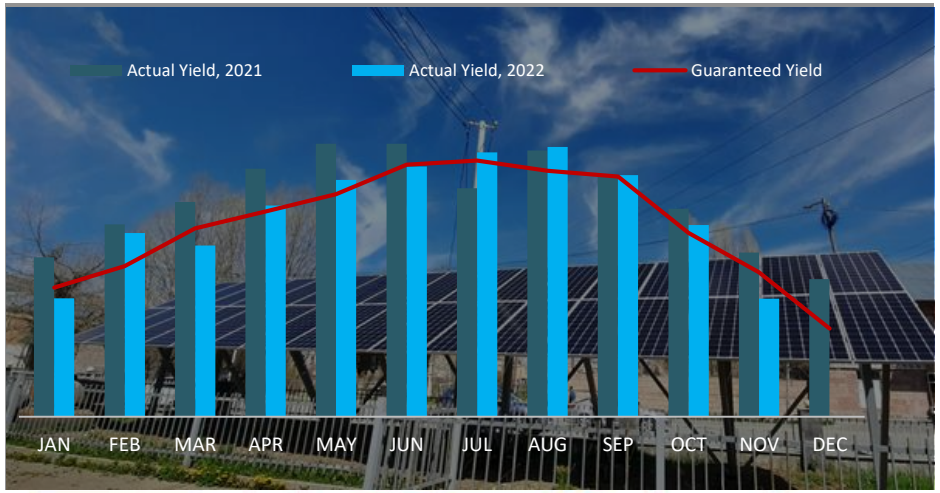
APARAN – CITY HALL

Planned capacity: 22 kWp
Guaranteed annual yield: 30,923 kWh
Actual annual yield, 2021: 34,647 kWh
Total reduced CO_2 emission: 28 tCO_2
Total profit: 2.7 THU USD



APARAN – CULTURAL HOUSE

Planned capacity: 11 kWp
Guaranteed annual yield: 15,172 kWh
Actual annual yield, 2021: 17,140 kWh
Total reduced CO_2 emission: 13.8 tCO_2
Total profit: 1.6 THU USD



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- **Activity 1 - Develop business models for implementation of the investment projects in communities (related to Op.3) / ARTIK**
  - Business Model: Licensed GRID CONNECTED COMMERCIAL PLANT under FEED-IN TARIFF
  - Financial Modeling and Business Plan Developed
  - CJSC established for license application [retracted later] – Construction & production license and respective permits obtained
  - The CNCO was established with 100% participation of Artik community (single shareholder)
  - The land is provided by Artik community to CNCO for free of charge use under termless lease
  - All equipment, including PV modules, inverters and other parts of the plant are a property of **Artik Solar Power CNCO**
  - CNCO generates revenue by selling electricity to ENA, all revenues accrue on extrabudgetary COMO fund
  - CNCO invests all revenue after paid costs in sustainable development projects within Artik Community.
  - Provision proposed in **Energy Sector Development Strategy till 2040** for designated Municipal Solar PV licenses (15MW total of up to 1MW plants), ESRE Law and Resolution № 374 amended
  - License activation paused by the State for private sector, municipal license window opened for Artik and other cities = 15MW.

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- **Activity 2 – Social survey in selected communities (related to Op.5)**
  - A social survey has been conducted in both communities covering the level of knowledge and awareness of the citizens and municipality employees. **[Ex-ante]**
  - Another survey implemented in Aparan after PV plants' completion **[Ex-post]**
  - Another survey conducted at the end of the project to assess the project impact **[Ex-post]**
  - **Target:** municipal employees, educators in schools and pre-school educations, municipal service providers, other members of the community
  - **Method:** Focus Groups based on jointly developed survey focusing on topics of EE, RE, CoM, SEAP, investments and benefits

EU4ASEP: ACTIVITIES & OUTCOMES

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Activity 3 – Technical assistance in design and implementation of solar power investment projects (related to Op.1&2)

Land Plot
- Sampling
- Modeling
- Feasibility Study
- Selection

Land Allocation
- Category Change
- Termless Leasing
- Mapping
- Lease Certificate

Establish. CNCO
- Elders Decree
- Charter &
- Registration
- Bank Account
- Bank Guarantee
- COMO Fund O&M drafted

Acquire Permits
- Technical Condition from ENA
- Design Permit
- Construction Permit
- Public Announcement(s)

Design Services
- Site Survey
- Geological & Geodetic Survey
- Environmental Assessment
- Sampling Scenarios & Shortlist
- Technical Design
- Expertise

Acquiring License
- Business Planning
- Energy Sector Devt Strategy 2040
- Law on ES&RE
- PSRC Resolution #374
- License Application

Construction Proc
- ToR & Procurement Package by WB rules
- Tender Launched
- Prebid Orientation
- Tender Evaluation
- Contracting

Construction
- Procurement of Imported Materials
- Leveling, Shoveling
- Drilling, Concrete
- Mounting
- Testing & Commissioning
- **Grid Connection**
- **METERING**

Tech Supervision
- Contracted (Limited Negotiation Procedure)
- COMO fund setup
- Testing & Commissioning
- Grid Connection
- METERING

Pending
- × PSRC Application for Launch

EU4ASEP: ACTIVITIES & OUTCOMES

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Activity 3 – Technical assistance in design and implementation of solar power investment projects (related to Op.1&2)

ARTIK 600 kW SOLAR PV PLANT
Estimated annual yield: 1334.5 MWh
Annual profit: 22 mln. AMD [54.6 THU USD]
Avoided CO2: 570 ton/year

Solar PV array
495W mono-crystalline bifacial module
1440 units; 712.8kW DC power

Solar inverter(s)
10 units of 60kW inverters
Max power: 80kW
European efficiency (Max eff.): 98.3% (98.8%)

Mounting structure
Ground mounted fixed; N type
Tilt angle: 30°
Sheds spacing: 8.62 meter
Inter-row spacing: 6.5 meter
Height above the ground: 1.20 meter

Grid connection
1000kVA transformer substation (SS)
Connection to ENA CJSC 110/35/10kV SS via 10kV OHL

EU4ASEP: ACTIVITIES & OUTCOMES

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- **Activity 4 – Development of the concept of the COMO Funds (Op.4)**
  - **Aparan: extra-budgetary fund**, will generate revenues only if surplus electricity is sold to the grid
    - Revenue streams from solar electricity sales and energy savings to be used for investing in SEAP Implementation.
    - Operational guidelines and eligibility criteria developed and adopted by Elders Council
  - **Artik COMO Fund: Solar Power CNCO** will generate revenues which will be accrued as COMO-fund, funds will be disbursed based on Municipal Guidance in implementation of Artik SEAP Measures.
    - COMO Fund concept and operational manual
    - Business plan and cash flow analysis

Eligible COMO Fund Financing Candidates

- Renewable energy systems
- Building energy efficiency retrofits:
  - Municipal buildings
  - Multi-apartment buildings (MAB)
- External lighting:
  - Municipal street lighting
  - Common-space external lighting for MAB premises (stairwell, courtyard, etc.)

Evaluation criteria are based on expected economic performance, local priorities, availability of co-financing, social & environmental benefits, etc.

EU4ASEP: ACTIVITIES & OUTCOMES

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- **Activity 5 – Capacity building & Visibility**
  - Sustainable energy days – 2018, 2019, 2021, 2022 – 13 events total!
    - Visibility was paused during the pandemic and the war in 2020, resumed in 2021-2022
    - 3418 citizens participating in training and capacity building events
  - Sustainable Energy EXPOs: Aparan 2018, Artik 2022
  - In both municipalities a number of working meetings were held on solar PV operation and management issues, O&M services, financial management
  - 230 online and offline articles, social-media posts were prepared and published, event coverages by the media, short movie releases.
  - TV and radio interviews
  - Progress video-documentation: 3 project videos


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LESSONS LEARNED

- Given the volatility of policies, have a contingency plan:
  - commercial licensing procedure which was proposed for use in Artik was suspended by Government. Legal reform was necessary.
- Have strong procurement expertise on-board
  - PRAG rules were not familiar to the market, after Aparan PVs, we switched to World Bank procurement rules for Artik PV plant
  - Regardless of all legal provisions, specify and document roles and responsibilities of parties involved in construction activities to its deepest in service contracts and discuss them during the kick-off meeting.
- Breaking down design and construction contracts allows to save time ahead, but splitting the responsibilities between two different contractors becomes cumbersome during construction (design revisions needed)
- Demand full paperwork completion from the city partner prior to initiating action, i.e. land allocation, property, committed funds availability, PPP scheme, etc. [check and double-check the info from the municipality with regional and state administrations]
- Start working on construction project as early as possible, despite visibility challenges from EUD, CoM-DeP ST
- In parallel to technical supervision, the PT experts should also conduct on-site inspections and report findings regularly [use Solar PV Inspection Toolkit].
- Invest in bank guarantees, in case funding tranches experience delays. Insist on advance payment from the city. Link hand-over acts to wires.
- Design budgets conservatively! Plan for Force Majeure – Pandemics and wars are more likely than we thought before.

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Thank you!

More info on

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