ARMENIA RENEWABLE RESOURCES AND ENERGY EFFICIENCY (R2E2) FUND

ENERGY SECTOR OF ARMENIA

Karen Asatryan
AREA: 29.7 ths km²
POPULATION: 3.0 mln
CAPITAL: YEREVAN
OFFICIAL LANGUAGE: ARMENIAN
MAIN NATIONALITY: ARMENIAN (98%)

CURRENCY: ARMENIAN DRAM
GDP 2018: $11.54 billion
ARMENIA’S ECONOMIC GROWTH 2018 5.8%
ENERGY SECTOR

- 1 Nuclear PP - 400 MW
- 3 Thermal PP - 1800 MW
- 3 HPP (2 cascade) – 990 MW operated
- 188 Small HPPs – 369 MW operated under 30 MW
- 33 Small HPPs – 66 MW under construction
- 9 Solar PV plant – 7 MW under operation 5 MW
- 10 Solar PV plant – 34.5 MW under const. up to 5 MW
- Masrik 1 - 55MW under construction
- 3 Wind Farm under operation – 2.9 MW
- 2 Wind Farm under construction - 5.3 MW
Electricity supply from power generating plants in 2018
7424 mln. kWh

<table>
<thead>
<tr>
<th>PLANTS</th>
<th>Mln.kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>1898.10</td>
</tr>
<tr>
<td>Thermal</td>
<td>3238.80</td>
</tr>
<tr>
<td>HPP</td>
<td>1297.80</td>
</tr>
<tr>
<td>RE</td>
<td>989.44</td>
</tr>
<tr>
<td>SHPP</td>
<td>981.50</td>
</tr>
<tr>
<td>Solar</td>
<td>6.14</td>
</tr>
<tr>
<td>Wind</td>
<td>1.80</td>
</tr>
</tbody>
</table>
Electricity consumption in 2018, by consumers - 5388.3 mln.kWh

- Population: 1815.2 mln.kWh (33%)
- Industry: 1265.8 mln.kWh (23%)
- Budget organizations: 211.6 mln.kWh (4%)
- Irrigation: 170.3 mln.kWh (3%)
- Transport: 96.2 mln.kWh (2%)
- Water supply: 62.2 mln.kWh (1%)
- Other: 1766.9 mln.kWh (34%)
Solar Potential of Armenia

- Average 1,720 kWh/year per square meter, compared with an average of 1,000 kWh/year in Europe.
- One quarter of the country’s territory has an annual capacity of 1,850 kWh per m² of solar energy and more than 300 sunny days in a year.
Currently, 20 companies have been licensed to build solar PV plants, from which:

- **12 companies** with a tariff of 0.0883 US dollar, 10 MW cumulative capacity

- **7 companies** with a tariff of 0.0492 US dollar, 34.5 MW cumulative capacity, maximum allowed 100 MW

  - **Masrik 1** with a tariff of 0.0419 US, 55 MW

- **20 years** purchase warranty

- **Yearly** adjustment based on inflation and US exchange rate

All amounts are without VAT
Under Net Metering law, it is possible to build up to 500 kW PV plant for self consumption purpose.

- 875 connected to the ENA, with 11 MW total capacity
- 53 in pipeline with 2 MW total capacity

![Solar Plant](image)
USA national laboratory (NREL) and Armenian «SolarEn» company together build the first wind energy resources map for Armenia. The wind recourses was estimated around 800 MWp.
Based on analyses: around 34% saving

- Building Sector – 40%
- Public Sector – 50%
- Industry Sector – 14%
- Transport Sector – 22%
- Agricultural Sector – 15%
The main mission of the Fund is to:

• Facilitate investments in RE and EE sectors,
• Promote RE and EE market development,
• Contribute to Armenian’s Energy Security by promoting the development of RE and EE,
• Organize on behalf of the Government implementation of credit and grant projects promoting the sector development.

R2E2 Fund is an environment forming institution in the area of renewable resources and energy efficiency. The R2E2 Fund was established by the Government of RA in 2006.
Main Activities

- RE and EE sector Surveys, Feasibility studies
- Turn-key services (energy audit, detailed design, procurement, financing, construction and monitoring) for EE measures
- Modernization of street lighting with energy efficient solutions
- Preliminary Energy Audits and Investment grade audits
- Financing of EE projects through the banks and directly
- Assistance in elaboration of sector related laws, strategy and regulations: Preparation of NEEAP
- Measurement and verification of Energy Saving Measures in Public Facilities
- Trainings, Workshops, Exhibitions and Energy weeks

R2E2 Fund Operation Fields

- Consulting
- Financing / Revolving fund
- Energy Efficiency
- Solar thermal
- Solar PV
- Geothermal
- Wind
Beneficiaries and Partners

**Beneficiaries**
- RA Government, Ministries and other public administrations
- Public organizations
- Municipal organizations
- Business entities (big, medium and small)

**Partners**
- RA Government, including other public bodies
- Local banks and credit organizations
- International organizations
- Non-Governmental Organizations, etc.
The Grant Agreement between the Republic of Armenia and International Bank for Reconstruction and Development was signed on June 5, 2015 for Preparation of Utility- Scale Solar Power Project out of the grant funds provided under the Scaling-up Renewable Energy Program in Low Income Countries (SREP) of the Strategic Climate Fund.

Feasibility studies were conducted in:

- DASHTADEM 1 PV PLANT - 12.5MWp
- GAGARIN PV PLANT - 15.24MWp
- MASRIK 1 PV PLANT - 55MWp
- MASRIK 2 PV PLANT - 19.4MWp
- MERDZAVAN PV PLANT - 5.5MWp
- TALIN 2 PV PLANT - 12.5MWp

Negotiate for 150 MWp
Drilling of two slim wells including full analysis of all received data. Phase I of the project completed with the drilling of two exploratory wells.

The first exploration well, B-1, was completed at 1500m and tested in September 2016. Result 130° C.

The second well, B-2, was completed at 1684m and tested in November 2016. Result 130-140° C.

Drilling of one industrial size well including Feasibility study and Transaction advisory.

For the time being implementation of the second Phase of the Project is temporarily stopped until R2E2 understands the interests of international investors.
## Energy Efficiency project Procurement based on NPV

<table>
<thead>
<tr>
<th>Project Development Objective Level Results Indicators</th>
<th>2012-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy savings in retrofitted social and public facilities (kWh)</td>
<td>543,646,137</td>
</tr>
<tr>
<td>CO₂ emission reduction in retrofitted social and public facilities (tCO₂)</td>
<td>145,739</td>
</tr>
<tr>
<td>Cumulative investments in social and public facilities (US Dollars)</td>
<td>10,197,863</td>
</tr>
<tr>
<td>Number of public facilities commissioned</td>
<td>186 projects</td>
</tr>
<tr>
<td>Schools, Kindergartens, State Universities, Hospitals, Theatres, Municipality buildings, Penitentiary, Street lighting</td>
<td></td>
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ENERGY EFFICIENCY
PROJECT
The Project implementation started in 2017. The objective of the project is to reduce energy consumption of households of non-gasified communities by using renewable energy sources and decrease greenhouse gas emissions.

<table>
<thead>
<tr>
<th>126</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>2685 pcs</td>
<td>Solar water heater</td>
</tr>
<tr>
<td>96pcs/512 kW</td>
<td>Solar PV units instalation</td>
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<tr>
<td>3503 ton</td>
<td>CO₂ annual reduction</td>
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</tbody>
</table>
Thank You.

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