

ARMENIA RENEWABLE RESOURCES
AND ENERGY EFFICIENCY FUND

ANNUAL REPORT *2017*

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Introductory speech



Dear Partners, the idea of replacing conventional energy sources with renewable resources has been a priority for international economic development long ago.

We have made great achievements in the above-mentioned areas in 2017, from which I would like to highlight the Utility scale solar PV project. The latter also contributed to the

increase of foreign investors' interest in number of other projects in Armenia.

R2E2 Fund continues to implement energy efficiency projects, focusing on increasing energy efficiency level in communities. The strategy is aimed at increasing Community energy efficiency and energy efficiency of non-gasificated communities implemented by the Fund.

In 2018, the Fund will pursue the smooth implementation of these projects, introducing innovative approaches to the development of the sector.

Summarizing the works done, I thank the Board of Trustees, our partners and the staff of the Fund for their success.

Sincerely,
Director of Armenia Renewable Resources
and Energy Efficiency Fund,
Armen Melikyan

Armenia Renewable Resources and Energy Efficiency Fund

Mission and Vision

The mission of Armenia Renewable Resources and Energy Efficiency Fund is to contribute energy security and freedom of Armenia through development of renewable energy and energy efficiency sectors.

The basic provisions of our vision and mission are clarified as follows:

- Promoting investments in renewable energy and energy efficiency sectors;
- Promoting market development;
- Contribute to the reduction of anthropogenic impacts on the environment, human health;
- Elaborating mechanisms directed to increasing the level of energy safety and energy system reliability;
- Organizing on behalf of the Government implementation of credit and grant projects promoting sector development.

Summarizing the above, Armenia Renewable Resources and Energy Efficiency Fund (the Fund) is a structure creating favourable

environment for the development of renewable energy and energy efficiency sectors by introducing the best practice of sustainable energy aimed at ensuring energy security and freedom and economic growth in Armenia.

Organizational Structure of the Fund

The management bodies of the Fund are the Board of Trustees and the Director of the Fund. The highest management body of the Fund is the Board of Trustees (BT) that has endowed with the overall strategic management of the Fund in accordance with the established objectives and principles of operation. The Board is comprised of representatives from public administration bodies, representatives from state and civil sectors, whose knowledge and experience meet the requirements. The representative composition of the BT is defined by the Charter of the Fund. The Board of Trustees of the Fund is headed by the Minister of Energy Infrastructures and Natural Resources of the RoA Ashot Manukyan. The BOT has 11 members and the structure is presented below:

Ashot Manukyan	Minister of Energy Infrastructures and Natural Resources of RA
Hayk Harutyunyan	Deputy Minister of Energy Infrastructures and Natural Resources of RA
Masis Baghdasaryan	Head of Staff of Ministry of Territorial Administration and Development of RA
Armen Ghularyan	Deputy Minister of State Urban Development Committee Under the Government of RA
Emil Tarasyan	Deputy Minister of Economic Developments and Investments of RA
Arthur Vardanyan	Member of Public Services Regulatory Commission of RA
Ashot Mkrtchyan	Board Member of Central Bank of RA
Rubik Davtyan	Adviser of Head of Department of financial planning of budget expenditures of Ministry of Finance of RA
Asya Muradyan	Head of Department of the Protection division of the atmospheric air of the Ministry of Nature Protection of RA
Mikhail Martirosyan	President of “Armenia Energy Services Provider Association”
Astghine Pasoyan	Director of “Alliance to Save Energy” Armenia Branch

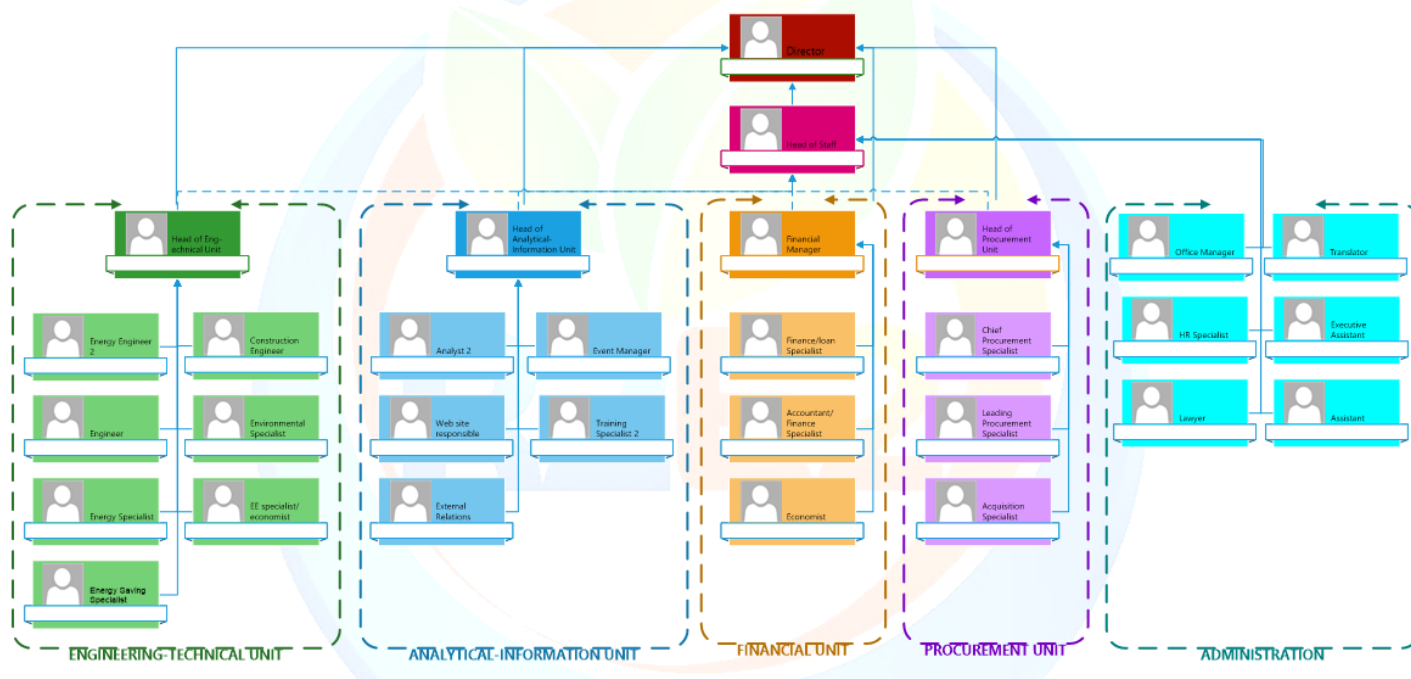
Anna Melik-Israyelyan is the secretary of the Fund's Board of Trustees. During 2017, the Fund organized 31 meetings of BT, during which issues related to the activities of the Fund were discussed and approved.

In 2017, Armen Melkikyan is appointed the director of the Fund. The Director of the

Fund implements authorities defined by the Law and the Fund Charter.

In 2017, by the decision of the Board of Trustees of the Fund, a new organizational structure of the Fund was formed, which is presented below:

Organizational Structure of the Fund



ENGINEERING-TECHNICAL GROUP

- ✓ Implements technical and engineering design work;
- ✓ Implements technical control of the works undertaken within scope of the projects of the Fund;
- ✓ Conducts calculations, design of renewable resources and energy efficiency projects and plans, prepares appropriate documents;
- ✓ Participates in RE & EE projects implemented by the Fund;
- ✓ Participates in the activities of conducting RE & EE relevant analyses and studies;
- ✓ Participates in the activities of developing project related documentation;

- ✓ Participates in the procurement process within the scope of RR & EE projects implemented by the Fund;
- ✓ Provides consultancy, technical and engineering services in the RR & EE sector.

ANALYTICAL-INFORMATION GROUP

- ✓ Implements studies of RR & EE sectors applying primary and secondary data;
- ✓ Develops analytical reports, articles, scientific-research materials, etc;
- ✓ Participates in the projects implemented by the Fund;
- ✓ Participates in the project monitoring and evaluation activities implemented by the Fund;

- ✓ Participates in the development of project related documents;
- ✓ Designs, organizes and implements corresponding trainings;
- ✓ Provides advisory services to the clients of the Fund;
- ✓ Is responsible for the web site of the Fund, for protecting, regular updating and running the pages in the social networks;
- ✓ Carries out all functions related to external relations of the Fund;
- ✓ Is responsible for organizing and implementing events held by the Fund.

FINANCIAL GROUP

- ✓ Undertakes financial planning of the Fund;
- ✓ Implements financial management of the Fund;
- ✓ Is responsible for running the accounting of the Fund;
- ✓ Participates in contracts signing procedures;
- ✓ Makes payments on behalf of the Fund;
- ✓ Is responsible for developing financial and accounting and other reports and their submission to relevant authorities;
- ✓ Maintains the bank accounts of the Fund;
- ✓ Participates in the development of project packages.

PROCUREMENT GROUP

- ✓ Is responsible for organization of the procurement procedures of the works, products and services implemented by the Fund within the scope of RE & EE, and other projects;
- ✓ Is responsible for providing advisory services to contractors;
- ✓ Is responsible for organizing the procurement processes of the works, products and services for the needs of the Fund;
- ✓ Participates in the preparation of RR & EE projects related documents (procurement part) implemented by the Fund;
- ✓ Participates in the process of preparation of tender documents/bids of the Fund;
- ✓ Is responsible for maintaining the procurement documents.

ADMINISTRATIVE-OPERATIONAL GROUP

- ✓ Ensures the natural flow of the Fund's activities in logistic matters;
- ✓ Ensures the document circulation of the Fund, is responsible for archiving and keeping of the documents;
- ✓ Ensures the support to the activities of the Fund Staff;
- ✓ Ensures written and verbal translations of the Fund;
- ✓ Undertakes all the functions related to Human Resources Management of the Fund;
- ✓ Ensures legal backup of the Fund.

Financial Statements

The works presented in the report are reflected in the financial statements of the works implemented by the Fund, which are submitted to the Ministry of Energy Infrastructures and Natural Resources, the Ministry of Finance, the Fund's Board of Trustees and donor organizations. Financial statements of the Fund are subject to annual statutory audit.

Armenia Renewable Resources and Energy Efficiency Fund covers the expenditures for the implementation of activities, as well as its functions stipulated

under the Charter from the annual budget and annual budgets of the implemented projects approved by the Fund's Board of Trustees.

Financial statements of the projects implemented by the Fund include information on financial performance related to the projects, financial statements of the Fund include all the financial information, both in the framework of the projects implemented, and on the financial performance within the framework of all contracts concluded by the Fund.

Payments made by beneficiaries under the energy efficiency project

Facilities of public importance	Investments	Service fee	Total paid amount	Total paid investment amount	Total paid service fee
Ararat basic school N4 SNCO, Ararat province of the RoA	19,550,000	2,219,740	12,829,784	9,231,944	1,596,357
Mets Masrik secondary school SNCO, Gegharkunik province of the RoA	23,000,000	2,323,958	14,184,037	12,218,748	1,807,357
Masis basic school N2 SNCO, Ararat province of the RoA	29,000,000	3,292,708	18,238,935	13,694,444	2,367,998
Gavar basic school N5 SNCO, Gegharkunik province of the RoA	19,000,000	2,394,792	9,842,250	7,916,667	1,575,087
Vayk city street lighting, Vayots Dzor province of the RoA	13,000,000	1,313,542	9,936,654	6,500,000	981,771
Vayk city Preschool N3 SNCO	10,000,000	1,260,417	4,804,168	4,000,000	804,167
Masis Medical Center CJSC, Ararat province of the RoA	87,164,998	10,291,334	34,553,248	27,832,264	6,365,064
Dilijan street lighting, Tavoush province of the RoA	15,796,540	1,212,104	11,849,545	10,261,818	1,062,205
Ltchashen community secondary school SNCO, Gegharkunik province of the RoA	20,800,000	2,361,667	10,681,212	9,051,852	1,602,932

Yerevan school N 21 after A. Shirvanzade SNCO	25,700,000	2,918,021	20,927,781	10,708,333	1,918,576
Yerevan State Institute of Theater and Cinema SNCO	48,000,000	5,450,000	25,090,501	20,888,889	3,699,074
National Archive of Armenia SNCO	36,500,000	4,144,271	18,645,746	14,870,370	2,679,765
Armenia State Economic University SNCO	95,890,080	8,490,268	50,549,217	44,520,414	6,028,803
Armenia State Engineering University SNCO	164,243,000	18,648,424	49,241,982	41,060,750	8,126,607
Yerevan basic school N 163 SNCO	19,950,000	1,766,406	9,211,550	8,050,172	1,160,286
Ararat basic school N1 SNCO	25,000,000	2,526,042	10,925,592	9,375,000	1,533,203
Yerevan basic school N 187	30,288,831	2,681,824	13,983,784	12,259,755	1,724,029
Dilijan basic school N 2	21,373,800	2,159,644	8,807,440	7,544,929	1,253,763
Scientific Center of Zoology and Hydrology of NAS RA	24,687,500	2,526,042	8,835,710	7,239,583	1,290,148
Yerevan basic school N61	19,000,000	1,919,792	7,632,506	6,531,250	1,088,542
Institute of Molecular Biology of NAS RA	115,000,000	13,865,885	35,117,893	27,878,788	5,063,013
Hrazdan city street lighting, Kotayk province of the RoA	49,500,000	5,001,563	19,765,072	16,550,143	2,835,938
Artashat municipality building, Ararat province of the RoA	30,000,000	3,031,250	12,045,868	10,312,502	1,718,750
Kapan city street lighting, Syunik province of the RoA	27,000,000	2,728,125	10,542,307	9,000,000	1,509,375
Echmiadzin city "Vagharshapat Hospital" CJSC, Armavir province of the RoA	127,000,000	14,419,792	32,593,583	27,033,340	5,465,606
"Vagharshapat Special School N2 for Children with Intellectual Disorders SNPO", Armavir province of the RA	35,800,000	4,064,792	11,502,677	9,612,455	1,882,539
<< Nubarashen >> Psychiatric Center SNCO	139,000,000	14,044,792	44,350,207	37,350,169	6,548,806
Yerevan school N 44 after Hrant Dink	45,000,000	4,546,875	22,808,595	15,000,000	2,515,625
Ashtarak city Medical Center, Aragatsotn province of the RoA	20,000,000	1,520,833	9,344,308	8,055,556	973,380
Artik street lighting, Shirak province of the RoA	17,800,000	1,798,542	7,557,660	6,676,899	878,797
Ijevan street lighting, Tavush province of the RoA	19,883,000	2,009,011	8,459,494	7,213,710	1,193,066
Sisian street lighting, Syunik province of the RoA	25,500,000	2,576,563	9,623,921	8,231,248	1,389,551
Nigavan secondary school, Aragatsotn province of the RoA	13,000,000	1,476,042	4,771,170	3,989,396	780,150
Yerevan school N 66	16,150,000	1,429,948	7,246,970	6,344,643	898,824
State Chamber Music Theater	12,259,790	1,555,354	3,315,582	2,696,281	618,928
Jermuk city street lighting, Vayots Dzor province of the RoA	25,700,000	2,275,521	10,814,002	8,872,619	1,293,924
"High Voltage Electric Networks" CJSC / Southern Branch / MEINR, RA	23,000,000	2,036,458	8,185,177	7,119,072	1,060,441
"High Voltage Electric Networks" CJSC / Goris, Zangezur Branches / MEINR, RA /	27,600,000	3,133,750	8,871,704	7,411,120	1,451,343
Akhuryan community/street lighting, Shirak province of the RA	18,040,000	1,597,292	7,144,121	6,013,333	883,208
Vagharshapat basic school N8 after G. Nzjdeh SNCO, Armavir province of the RoA	18,524,000	1,408,596	8,088,708	6,946,500	853,841

"High Voltage Electric Networks" CJSC / Eastern Branch / MEINR, RA	26,900,000	2,045,521	10,514,698	9,340,275	1,167,535
<<Nubarashen>> penitentiary	466,244,100	47,110,081	80,874,648	65,710,384	8,593,010
<<Abovyan>> penitentiary	221,500,000	22,380,729	28,332,691	23,843,750	3,671,107
<<Artik>> penitentiary	87,356,899	7,033,101	6,167,743	4,574,307	1,408,910
<< Hospital for convicts >> penitentiary	229,000,000	20,276,042	40,444,777	34,535,714	4,064,656
<<Vardashen>> penitentiary <<Erebuni>> branch	190,392,300	15,010,625	11,470,929	9,217,300	1,899,486
<<Kosh>> penitentiary	333,948,000	29,568,313	58,213,328	49,780,143	5,927,439
<<Vardashen>> penitentiary	110,300,000	8,387,396	18,838,096	15,787,500	2,271,752
<<Hrazdan>> penitentiary	47,822,400	5,518,126	11,728,182	9,322,400	1,706,046
National Library of Armenia	71,000,000	8,061,458	29,393,720	14,462,963	2,937,789
"Yerevan State Olympic College of Olympic Reserve" SNCO	26,973,000	3,065,625	10,787,663	5,223,000	1,071,875
<<Yerevan State Puppet Theater after H. Tumanyan>> SNCO	32,900,000	3,735,521	9,140,957	7,006,481	1,415,893
Institute of Physical Researches SNCO of the National Academy of Sciences of the Republic of Armenia	42,800,000	4,859,583	10,888,757	8,718,519	1,770,949
<<Sevan > penitentiary	316,545,519	24,155,192	45,357,023	39,359,642	4,838,901
<< The National Academy of Sciences of the Republic of Armenia. Institute of Physiology after Orbeli >> SNCO	30,000,000	2,281,250	8,495,111	7,083,333	944,444
Margahovit secondary school after H. Toumanyany SNCO, Lori province of the RoA	25,000,000	2,838,542	4,756,945	3,934,868	819,830
Spitak municipality, Lori province of the RoA	29,900,000	3,021,146	5,183,160	4,360,430	813,036
<< Procurement Support Center >> SNCO	13,000,000	988,542	13,246,797	13,000,000	246,797
<<Vanadzor>> penitentiary	88,612,327	8,953,537	9,374,717	7,538,270	1,468,647
Hrazdan municipality (Hrazdan municipality building, Hrazdan Preschool N2 SNCO)	236,600,000	23,906,458	29,699,182	24,185,657	5,139,683
<< Yerevan State College of Choreography >> SNCO	24,000,000	2,725,000	3,502,777	2,666,667	569,444
<<Kanakaner-Zeytun>> MC CJSC	148,404,000	16,917,708	2,787,819	2,163,259	617,959
<<Armavir>> penitentiary	179,510,000	11,406,365	9,717,225		
Armenian Russian (slavonik) University	161,000,000	18,280,208			
Total	4,693,410,084	456,948,049	1,091,837,606	877,879,819	141,846,027

Loans to PFOs under Community Energy Efficiency and Energy Efficiency Improvement projects in non-gasificated Communities in Armenia

PFO	Loan amount	Loan interest	Loan period (month)
Global Credit UCO CJSC	34,660,000	3%	96
AGBA LEASING CO CJSC	3,404,000	3%	60
AKBA-CREDIT AGRICOLE BANK	41,350,000	5%	60
Total	79,414,000		

Payments made to the Ministry of Finance by the Fund

According to the Agency agreement signed between the Ministry of Finance of the RoA and Armenia Renewable Resources and Energy Efficiency Fund on July 30, 2012, the

amounts returned to the Ministry of Finance by the Fund, pursuant to the schedules of Anexes 1 and 2 of the Agency Agreement by December 31, 2017, are as follows:

	Loan amount		Interest amount	
	AMD	USD	AMD	USD
November, 2015	3,464,253	46,463	6,551,742	17,913
May, 2016	17,402,579	18,466	6,496,293	17,544
November, 2016	17,402,579	23,466	6,501,885	17,667
May, 2017	17,402,579	23,466	6,331,510	17,293
November, 2017	17,402,579	23,466	6,370,293	17,490
Total	73,074,569	135,327	32,251,723	87,907

The amount of 73,074,569 AMD and 135,327 USD was paid by the Fund by December 31, 2017, against which 32,251,723 AMD and 87,907 USD interest amount was calculated and paid.

Remaining financial resources allocated the Fund by December 31, 2017, constitutes 4,602,504.22 USD and 1,667,493,776.9 AMD.

Projects

Energy Efficiency Project

The Government of the Republic of Armenia has undertaken to carry out the World Bank supported EE projects in public facilities (schools and other educational institutions, kindergartens, hospitals, administrative buildings, cultural and residential building outdoor lighting and

others) since 2012. The main objective of the project is to increase energy efficiency in public buildings and external lighting networks by making investing in energy saving measures. The project was financed by the World Bank grant of \$ 2.12 million USD and 8.5 million USD from the Revolving Fund managed by Armenia Renewable Resources and Energy Efficiency Fund. Revolving Funds

are the funds allocated under the Agency agreement signed between the R2E2 Fund and the Ministry of Finance of the Republic of Armenia on July 30, 2012, are envisaged to ensure the implementation of the Fund's Energy Efficiency and Renewable Energy Financing Project. The Grant project has been completed on June 30, 2016, but the project implementation continues with the financing of the revolving Fund.

In particular, during 2016-2017 energy saving measures have been implemented in the Erebuni, Nubarashen and Armavir penitentiary institutions of the Ministry of Justice of the Republic of Armenia, Kanaker-Zeytun Medical Center, Hrazdan Municipality Building and Hrazdan N12 and N13 preschool educational institutions, Armenian-Russian (Slavonic) University, Yerevan State College of Dancing. The following energy-saving measures have been implemented:

- replacement of external windows and doors,
- insulation of external walls and roof,
- installation of modern heating, hot water supply and air conditioning systems,
- renovation of artificial lighting system,
- installation of heat pump, solar water heating and photovoltaic systems.

In the framework of the Energy Efficiency Project, in total energy saving measures have been implemented in 64 public facilities (about 160 buildings and 9 street lighting systems). The total investment amount made 4693 mln. AMD (\$ 10.35 million), annual energy saving is 28174420 kWh, annual reduction of CO2 emission is 7,223 tons.

The interest in the project remains high, it is proved by more than 20 requests for interests from public facilities that are currently being studied by the Fund's specialists. Implementation of energy saving measures at 5 facilities has been approved by the Fund's Board of Trustees and preparation of the competitive documentation is currently in progress.

Utility-Scale Solar Power Project

In recent years, significant reduction of the cost of solar photovoltaic (PV) technology, and consequently, decrease in the volume of capital investments required for the construction of solar power plants has made the PV technology power generation more competitive towards the other technologies available in the world.

Preliminary calculations indicate that using financing of the Climate Investment Funds Scaling-up Renewable Energy Project (SREP) or by using additional soft funding, it is possible to get a competitive price for the construction of PV solar plants in Armenia, which will not have a negative impact on the end-users and in its turn, will create an opportunity for the construction of utility scale solar PV stations in Armenia and attract solar energy world-famous leading companies to the energy market of the country.

Considering the importance of scaling up various renewable energy technologies and the proper legal and regulatory framework, the Government of Armenia has applied and received Grant from Climate Investment Funds Scaling-up Renewable Energy Program

(SREP) in low income countries administered by International Bank for Reconstruction and Development (IBRD) toward the cost of preparation of Utility-Scale Solar Power Project and currently applies part of proceeds for project preparation which includes solar resource assessment, carrying out feasibility studies, transaction advisory services, capacity building and other related activities. Armenia Renewable Resources and Energy Efficiency Fund, as a grant implementation agency, within the Investment Project framework, with the assistance of the WB grant in the amount of 2 million USD and \$ 0.5 million USD co-financing of the Government of Armenia, implemented solar energy potential assessment of Armenia, feasibility studies for selected six sites, transaction advisory services, relevant capacity building and other related measures.

«Masrik-1» solar PV project

“Masrik-1” solar PV plant will be built in Mets Masrik community of Gegharkunik province of the Republic of Armenia. The project is estimated to have 46.55 MW installed capacity, peak power of 55.45 MW, power factor of 22%, and an estimated annual production of 89 million kWh. The total cost of “Masrik-1” project is about \$ 60 million. Since the beginning of 2017, the Fund has conducted a wide public awareness campaign for potential investors of “Masrik-1” project. Representatives of more than 40 foreign companies were taking part in the “Energy Week” held in Yerevan in February 2017. The high interest of the investors was also evidenced at the pre-qualification stage of the project. By the recommendation of the

Ministry of Energy Infrastructures and Natural Resources of the Republic of Armenia, the Fund invited private developers and consortiums to the pre-qualification stage of the investor’s completion, more than 70 companies from 20 countries bought bids. Twenty companies submitted applications, 10 of which met the required experience and financing constraints for the project implementation and passed to the next, main stage of the bidding process.

“Masrik-1” project will be developed on the principle of design, financing, building, ownership and operation (DFBOO) by a company of special importance, the 100% owner of which must be the winning bidder. The project company shall be formed and located in the Republic of Armenia to serve the Special Project Goal.

In order to ensure successful course and completion of “Masrik-1” project, the Fund has concluded transaction advisory services contract with “AVAG Solutions” LLC (Armenia), (Deloitte Touche Tohmatsu India LLP (India) - Deloitte & Touche LLC (Ukraine) - Morgan , Lewis & Bockius LLP (UK) (Subconsultants)). The objective of the contract is to provide consultation and support to the Fund and the Government of Armenia in preparing, organizing, implementing and completing tender of investors for “Masrik-1” project, as well as negotiating with the investor selected until the financial closure of “Masrik-1” project, signing all agreements, ensuring all project financing preconditions and starting construction). By 2017, “AVAG Solutions” LLC has developed a comprehensive due diligence

report, draft “Masrik-1” project agreements, reviewed, revised and improved the existing financial model, prepared bidding documents and the request for proposals.

Taking into account the fact that the right of implementation of the “Masrik-1” project will be awarded to a company that will offer the minimum electricity tariff, the successful course of the project will determine the vector of further development of the sector and will undoubtedly stimulate the growth of foreign investment in renewable energy sector.

At the end of December 2017, Armenia Renewable Resources and Energy Efficiency Fund announced the launch of utility scale “Masrik-1” solar photovoltaic project in Armenia. 10 international companies and consortiums will submit their proposals within 70 days and the lowest tariff will be the winner.

In addition to the solar energy development in the Republic of Armenia, No.544A and No. 543N Decisions of the Public Services Regulatory Commission of the RoA dated December 13, 2017, confirmed construction of (reconstruction) 30 MW and more installed capacity with a legal guarantee on procurement for electricity transmission and electricity purchase and sale agreement for the connection to the distribution network, regulatory-commissioning works, and the terms of licensing for electricity generation by the company.

Geothermal project

The Republic of Armenia has received a SREP Grant from the Climate Investment Funds Scaling-up Renewable Energy Program in Low Income Countries (SREP) (administered by the International Bank for Reconstruction and Development (IBRD)) toward the cost of the Geothermal Exploratory Drilling Project.



The results of preparation and design of the project are acceptable for the SREP board and for the implementation of Geothermal Exploratory Drilling Project (P152039) Grant Contract was signed on 16 June, 2015. It was approved to provide a grant in amount of \$8,550,000 to Armenia for Geothermal Exploratory Drilling Project on February 22, 2015. The Government of Armenia finances about 20 percent of expenses.

The first phase of the project envisages preparation and implementation of bidding documents for the construction of access road, water supply system and drilling platform, including technical supervision, preparation and implementation of bidding documents for drilling of two slim wells, including technical supervision, logging, testing and audit.

The second phase involves preparation and implementation of bidding documents for the construction of a water supply system and a drilling platform for the production well, preparation and implementation of bidding documents for the production well drilling, including technical supervision, logging and testing. In addition, it is also envisaged to carry out feasibility study, transaction advisory services and audit of the geothermal power plant.

Received informational data was used to calculate the production capacity and cost of the conceptual 10MW geothermal plant. In case of the high temperature, energy cost will diverge from 9 to 10 cents, which is a competitive cost that can be inflated in future to get a lower rate.

The first well is located at an altitude of 3,000 meters above sea level. The drilling works started on 7.15.2016 and were completed on 9.29.2016. The maximum temperature is 110°C.

The second well is located at an altitude of 2989 meters above sea level. The drilling works started on 10.8.2016 and ended on 12.1.2016. The maximum temperature is 130°C.

Activities carried out in 2017

In the framework of the geothermal exploration drilling project, a preliminary cost calculation (for the power plant and power generation) was made for the construction of a Geothermal/Organic Rankine Cycle(ORC) Power Plant at Karkar geothermal area in

Armenia, based on informational data supplied by R2E2 Fund on Karkar area.

Preliminary cost calculation is carried out by Icelandic specialized consulting organization Verkis.

In the framework of Geothermal exploratory drilling project, it is envisaged to look for international investment companies for the construction of a Geothermal/Organic Rankine Cycle (ORC) Power Plant in Karkar geothermal area. The well-test reports on the wells separately and the final report of the wells were sent electronically to more than fifty international investment organizations.

Initial interest requests have been received from two organizations and the Fund plans to hold discussions with them.

As a result of the discussions, arrangements have already been reached to deepen discussions with both organizations regarding the implementation of the investment project in accordance with existing international standards/practices.

Within the framework of the geothermal exploratory drilling project, it was envisaged to prepare a revised version of the Economic and Financial Assessment Report (including Investment Booklet Preparation), of future Karkar Geothermal power plant which was assigned to the Director of the American “DH Infrastructures” Advisory organization, Denzel Hanksinson, by the World Bank's request. The draft report and the investment booklet have already been submitted to the Fund.

Mr. Hesi Ram the representative of American “Ram Energy” (International Company implementing investment projects in geothermal sector) visited Armenia and got acquainted with the works carried out within the framework of the Geothermal Exploratory Drilling Project, made field visit to Karkar, where 2 slim wells were drilled. The meeting was organized with the Deputy Minister of Energy and Natural Resources Hayk Harutyunyan, during which clarifications were given to Mr. Rumi's questions.

To extend the list of investing companies, 2 slim well test results and final reports were provided to the diplomatic institutions in Armenia.

Community energy efficiency improvement Project for legal and physical entities of non-gasificated communities in Armenia

Armenia Renewable Resources and Energy Efficiency Fund, signed contracts on the Energy Efficiency Improvement Project for non-gasificated communities in Armenia. The objective of the project is to finance investments in clean energy sector through financial institutions. The latter aims to increase energy efficiency performance through financial institutions in nearly 280 communities of Armenia and to finance investments for the development of clean energy sector.

About 37 thousand households are not gasified in Armenia, which are not included in the gasification projects due to their

economic inefficiency. In order to improve the living conditions of the population in those communities, by the decision Prime Minister Karen Karapetyan of RA, a working group was formed headed by the Minister of Energy infrastructures and Natural Resources of the RA Ashot Manukyan, in which representatives of different agencies, as well as the Armenia Renewable Resources and Energy Efficiency Fund were included.



Targeted measures aimed at solving the problem have been developed for non-gasificated communities, on the basis of which the contract will be signed.

In October-November of 2017, the Fund's specialists have endorsed the installation of 194 solar water heating systems and two solar photovoltaic systems. The loan amount is 38 million AMD.

Community Energy Efficiency Project

Community Energy Efficiency Project is implemented jointly by Armenia Renewable Resources and Energy Efficiency Fund, ACBA-CREDIT AGRICOLE BANK CJSC and CONVERSE BANK CJSC commercial banks aiming to finance investments for energy efficiency improvements in the communities of the

Republic of Armenia. Moreover, the objective of the project is also to reduce non-efficient energy consumption and increase the use of clean, efficient, safe and affordable energy technologies. The ESMs will contribute to reduce the households' monthly energy and water heating expenses and the bill they pay against consumed electricity, and the subsequent reductions. Within the framework of the project, the Fund specialists studied energy efficiency projects of Kasakh and Nor Yerznka communities of Kotayk region, Isahakyan community of Shirak region, Alaverdi community of Lori region. Talin community of Aragatsotn region also submitted a request for interest for participating in the project.



The first community-based energy efficiency project is implemented in Kasakh community of Kotayk region, within the framework of which the following energy saving measures (ESMs) have been implemented: installation of solar PV systems, installation of solar water heaters on the roofs of around 15 households, as well as replacing non-efficient lamps with LED lamps in the community external lighting systems. The total investment amount is 41.3 million AMD.

Provision of Engineering Advisory Services in the framework of German-Armenian Fund Project "Energy Efficiency for MSMEs"

The objective of the project is to support financing of energy saving measures in micro, small and medium enterprises (MSMEs) in Armenia. According to the Contract, 164 energy audits were carried out by the R2E2 Fund experts, 152 were simplified energy audits (with investment amount of no more than AMD 80 million), 12 energy audits (with investment amount above AMD 80 million), and 2 initial energy assessments. The total loan amount was 5,603 mln. AMD. The loan was provided through 9 financial institutions and included the following areas: industry, food production, heating, ventilation, air conditioning systems, healthcare, printing and information equipment, refrigeration, artificial lighting, energy saving measures of buildings/structures external structures, transport, solar water supply and photovoltaic systems.

Other projects

Implementation of projects funded by the International financial institutions, Armenia Renewable Resources and Energy Efficiency Fund especially focuses on the implementation of environmental and social mitigation measures within the framework of these projects, ensuring compliance with the requirements of national legislation and the relevant guidelines of the financial institution's safety measures. Environmental and social management of the projects are

being implemented starting from their preparation stage and continuing during the course of implementation, if it is envisaged.

Within the framework of the Community Energy Efficiency Project, relevant environmental management monitoring has been conducted in the construction sites for the acceptance of final works.

Within the framework of the World Bank Workshop on Exchange Experience of Energy Efficiency projects implemented by the Fund, environmental management awareness meeting was held for the representatives of Balkan countries.

Environmental Impact Assessment was implemented within the framework of the contract with the German Company "Envidatec GmbH" for the Street Lighting Component of the Gyumri Urban Roads project financed by the European Bank for Reconstruction and Development (EBRD), and a relevant Report was prepared according to the EBRD "Environmental and Social Policy" (2008) and its "Performance Requirements" and the EIA Directive of the European Union. The "Stakeholder Engagement Plan" has been elaborated in accordance with the "Performance Requirement 10" of EBRD and

"Environmental and Social Action Plan" for the implementation of the street lighting component.

From the list of services provided by the Fund during 2017, a contract signed with the "National Tuberculosis Center of the ministry of Health" State Non-Commercial Organization may be highlighted. According to the contract, the Fund prepared Terms of Reference for the design of solar power plant construction of the "National Tuberculosis Center of the Ministry of Health, which was the constituent part of the tender documentation. Moreover, the Fund and the "National Tuberculosis Center of the Ministry of Health SNCO" signed a Memorandum for the implementation of energy audit in the Center. The purpose of the Memorandum is to carry out energy audit and develop a set of possible energy saving measures in the facility. According to the latter, the Fund studied electricity consumption of the facility and implemented energy surveys, developed a package of energy saving measures aimed at reducing energy consumption of the facility, evaluated economic and technical/feasibility indicators and provided energy advisory services.

Public Awareness Campains

In the scope of Public Relations and Awareness campains, the Fund has initiated and implemented various activities aimed at creating and strengthening public awareness for the necessity of energy efficiency for everyone. For this purpose, conferences, seminars and trainings were organized and held by the Fund. Representatives from the state and local government bodies, state and private organizations, financial institutions, international organizations, students, experts and other stakeholders took part in the events.

Meetings with the heads of communities, non-governmental organizations, university students, and high school students were organized.

The Fund specialists took part in the events organized by the institutions and other organizations operating in the field, where they presented the activities of the Fund in energy efficiency and renewable energy sector.

In the scope of experience exchange programs, the Fund experts participated in meetings and forums organized by various organizations, presenting the Fund's activities in EE and RE sectors.

In 2017, the following conferences were organized by the Fund:

- ❖ On January 25-27, traditional "Energy Week" was organized by the Fund, which is an event held annually on a regular



basis, which was aimed at presenting the latest developments in energy efficiency and renewable energy sectors in Armenia, main difficulties existing in the sector, investment opportunities, possible financing sources, technological and engineering solutions, and forthcoming projects.

- ❖ On May 17, the Embassy of the United States of America in Armenia with the support of the R2E2 Fund organized public awareness events to inform about RE investment projects implementing in Armenia.

- ❖ The Embassy of the Czech Republic in Yerevan has organized a presentation seminar in the framework of an economic cooperation project on May 30, 2017. The aim of the seminar was to present the interested parties to the professional technological solutions by Czech experts and companies operating in the solar, wind and hydro power sphere, as well as to present the energy sector of Armenia, particularly RE investment projects.

- ❖ International Specialized Exhibition Expo-2017 in Astana started its work on June 9, 2017 and ended on September 10, 2017. The main theme of Expo-2017 was "Energy of the Future". Armenia Renewable

Resources and Energy Efficiency Fund has been appointed to be the national operator of “Astana Expo 2017” exhibition. Armenian pavilion presented the achievements of energy system of Armenia in recent years, particularly in the spheres of EE and RE.

- ❖ The specialists from “Effergy” Spanish company presented the results of solar potential assessment and mapping activities in Armenia at the R2E2 Fund office on June 27. The representatives of the alternative Energy Sector, Educational Institutions, Hydrometeorological Services and other stakeholders participated in the meeting. The Fund has initiated series of information awareness events within the framework Energy Efficiency improvement in non-gasificated communities Project. Articles about the launch of the project were published in Armenian electronic newspapers (Tert.am, News.am, Banks.am)
- ❖ Armenia Renewable Resources and Energy Efficiency Fund specialists held

awareness courses on Energy Efficiency and Renewable Energy for high school students at the Global Bridge educational center. Within the framework of the event, it was envisaged to expand the number of educational institutions.

- ❖ The Bachelor's and Master's Degree students of the Institute of Power Engineering and Electrical Engineering of the National Polytechnic University of Armenia have been trained by the specialists of the Fund.
- ❖ Armenia Renewable Resources and Energy Efficiency Fund has started to publish an electronic newsletter periodically, where the activities of the Fund, the latest developments in the sector are reflected.

In order to inform the Fund’s activities, all information is posted in social networks and websites opened by the Fund.

Exhibitions

“Energy Week 2017”

Traditional “Energy Week 2017” series of Events launched on January 25-27, 2017, which was organized by Armenia Renewable Resources and Energy Efficiency Fund.



The President of the RA Mr. Serzh Sargsyan, the World Bank Country Director Mrs. Laura Bailey, the Deputy Minister of Energy Infrastructure and Natural Resources Mr. Hayk Harutyunyan, representatives of international institutions, non-governmental and financial organizations, foreign investors, private and public-sector representatives and experts took part in the opening ceremony of the event.

These regular events organized by the Fund were aimed at presenting the latest developments in energy efficiency and renewable energy sector, investment

opportunities and possible sources of funding, technological and engineering solutions, perspectives and problems existing in the sector. The series of Events included a three-day exhibition, which represented local producers and professional companies working in the sector. It acquainted with insulating materials, energy efficient lighting and heating systems, solar technology schemes and services. The exhibition was attended by 28 specialized companies.

Investors represent different countries, such as France, Germany, Spain, Italy, Holland, Switzerland, USA, United Arab Emirates, India, Iran, Lebanon, China, Russia, Ukraine and others.



The first solar power station construction prospects in Masrik 1 site in Gegharkunik region, as well as the details of the tender were presented at the Conference. The anticipated capacity of the power station is 55 MW, although a station of about 95 MW capacity is possible to construct in the selected site. The Tender will allow to obtain the lowest price proposal through participation of eligible companies and investors. The participation of public officials

and round-table discussions was not only confidence and guarantee for the investors, but also a good opportunity to provide clarifications on key issues in terms of legislation.

«Astana Expo 2017»

International Specialized Exhibition “Expo-2017” in Astana was launched on June 9, 2017 and ended on September 10, 2017. Armenia Renewable Resources and Energy Efficiency Fund has been appointed to be the national operator of “Astana Expo 2017” exhibition by the decision of the Prime Minister of the Republic of Armenia.



To ensure effective participation of the Republic of Armenia in the exhibition, R2E2 Fund was supported by Armenia Development Fund, and the construction of the pavilion was completed by “ExpoMedia” LLC. R2E2 Fund was also supported greatly by the Embassy of the Republic of Armenia to Kazakhstan.

The pavilion of the RA at “Astana Expo 2017” exhibition was focused on energy, culture and tourism. The recent achievements in energy system were presented in the Armenian pavilion of “Astana Expo 2017”,

such as the construction of solar power plants, the utility-scale geothermal exploratory drilling project, the power sector legislative reforms, the latest developments in science and technology solutions in “clean energy” sector, as well as private companies involved in the field of energy production. Series of films dedicated to tourism in

Armenia also were introduced during the exhibition, the visitors of the pavilion could see real pictures of Armenia’s tourist attractions by VR (Virtual Reality) glasses. The representatives from 115 countries participated in Expo-2017, and more than 5 million people visited the exhibition.

Partners

International Partners

Since its founding, Armenia Renewable Resources and Energy Efficiency Fund has cooperated with both local and international stakeholders. In 2017, the Fund has continued its strategy, as a result of which new partners have been acquired.

❖ In 2017, the Fund has actively participated in the discussions with the Russian Federation UNDP Trust Fund for Development. As a result, the parties agreed that, within the framework of UNDP funding and the co-financing of the Fund, the Fund implemented "Competitive Financial Instruments for the Promotion of Green Energy Production in Vulnerable Community Households of Armenia" project (\$ 600,000, UNDP Grant, \$ 400,000, co-financing). The vulnerable families of Shirak and Gegharkunik marzes were selected as target groups. The support will be provided by the installation of solar water heaters and combined solar PV systems. The project funds will also contribute to the replenishment of the Fund's revolving fund.

❖ In 2017, the “European Business Association” was one of the first companies’ co-operating with Armenia Renewable Resources and Energy Efficiency Fund. Moreover, a Memorandum of Understanding has been signed, which envisages the implementation of renewable energy and energy efficiency projects in Armenia, developing and introducing new public policies into renewable energy and energy efficiency sectors.

❖ “In accordance with the agreement reached between the RAM Energy



Incorporation and the Fund, the company's president, Heghi Ram, arrived in Armenia and achieved a number of agreements for further



co-operation within the framework of "Geothermal Exploration Drilling Project".

❖ On September 11-12, within the framework of Geothermal Energy Forum held in Florence, Italy, the Fund and “ENEL” Company expressed readiness to cooperate for the development of geothermal energy in Armenia. Moreover, this co-operation has all the preconditions for registering success in geothermal energy sector in Armenia, as “ENEL” is a leading and largest investor in the field of geothermal energy in Italy.

❖ Number of meetings/discussions was also held with the representatives of French Agency for Development. The Fund's specialists have developed and submitted a draft program for the implementation of energy saving (ESMs) measures in public facilities to the French Development Agency. Currently, the French Agency for Development evaluates the credit-worthiness of the Fund and studies the possibility and conditions and terms of the loan provision.

❖ Armenia Renewable Resources and Energy Efficiency Fund and “Technology & Science Dynamics” LLC signed a Memorandum of Understanding, which envisages development, coordination, support and implementation of information technologies and innovative projects for the development of renewable energy and energy efficiency sectors in Armenia. Moreover, cooperation between the Fund



and “Technology and Science Dynamics” LLC will contribute to the development of renewable energy and energy efficiency sectors, will introduce the latest technologies and innovative solutions in these areas, as well as it will promote to design relevant systems and projects for implementation.

Measures taken jointly with the Ministry of Energy Infrastructures and Natural Resources of the RA

Armenia Renewable Resources and Energy Efficiency Fund and the Ministry of Energy Infrastructures and Natural Resources of the Republic of Armenia are constantly cooperating in the courses of projects implementation, development and analysis

of sector related to the laws. In 2017, the Fund and the Ministry of Energy Infrastructures and Natural Resources of Armenia have collaborated in a number of spheres, which are mentioned as follows:

Within the framework of the assessment of solar PV sector developments in Armenia, elaboration of Energy Balance for 2016, as well as upgrading the monitoring and evaluation system of National Energy Efficiency Action Plan (ESAP-2) has been implemented.

Energy balance is an important tool for the energy sector investigation and national policy development of the country. It allows to assess the level of energy security in the country, diversification of energy supply, renewable energy developments, greenhouse gas emissions, as well as analyze energy efficiency projects dynamics.

Energy balance is a major measure of the energy efficiency and renewable energy indicators of the country, as well as the assessment, documentation and monitoring of the targets of the Energy Efficiency Action Plan (EAP-2).

Energy balance is one of the main sources of the baseline data collection of the "Energy" sector of the National Greenhouse Gas Registry (GHG). Based on the public interest towards the ongoing implementation of energy saving measures within the framework of Energy Efficiency Project, implemented by Armenia Renewable Resources and Energy Efficiency Fund with the assistance of the World Bank financing in 2012-2016, the R2E2 Fund employees have developed a package of tender documentation, according to the sample

documents of the "Low on Procurement" of the RoA, for the financial aid of energy saving measures and Energy Efficiency Services Agreement and Energy Efficiency Investment Agreement. Through the package of documents mentioned above, it will be possible to evaluate applications received through the e-procurement system instead of the minimum price, based on the net cost (NPV), which will ensure effective energy saving percentage to be achieved as a result of energy saving measures.

Energy Efficiency Services Agreement and Energy Efficiency Investment Agreement will be signed with the beneficiary, an agreement will be signed with the contractor on the basis of the contract drafted in the result of the procurement procedures. The developed package of documents has been submitted to the respective stakeholder organizations for the discussion.

The Government of Armenia decided to amend the Decision N 174-N dated 16 February 2012, which was required by the necessity to make further use of credit means defined by the agency agreement signed on July 30, 2012 by the Fund and the Ministry of Finance of the Republic of Armenia.

The amendment is based on the fact that the Fund increases 20% (instead of the previous 10%) to services of the eligible beneficiary, for the further monitoring and administration of the payments.