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BEST PRACTICES OF RES CONSTRUCTION IN ARMENIA

Renewable Resources & Energy Efficiency fund
Republic of Armenia

www.r2e2.am





Currently installed RES capacities

Generating units	Number of installed plants	Overall potential/capacity, MW	Installed Capacity, MW	Annual Production, GWh
SHPP	150	350	263	771
Wind	1	795	2,64	5,0
Biomass	1	29	0,835	5,9
Solar PV	1	1000	0,01	0,015
Solar thermal	NA	1400	4	7
Total	153	3574	271,5	789



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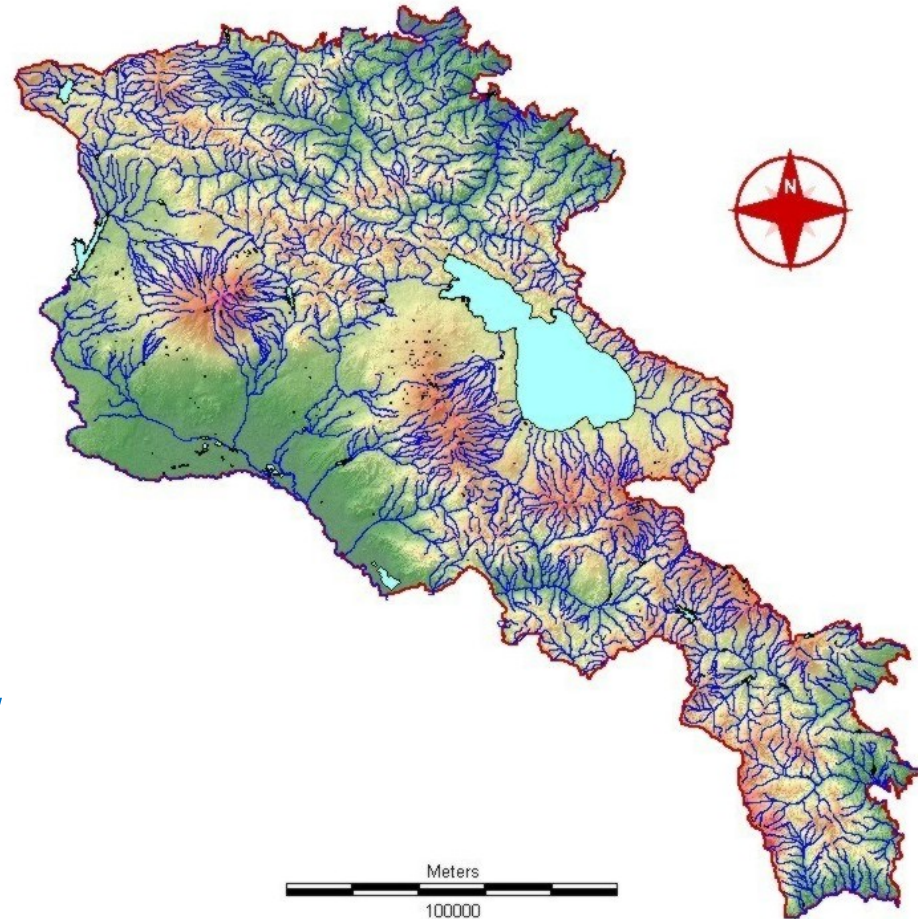
Feasible Potential of Renewable Resources in Armenia



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Map of Surface Hydrology (rivers, lakes, reservoirs)



Hydro
350MW



Commercial loans of SHPPs

- Commercial loans at reasonable percentage have been provided to Armenia from EBRD, WB, KFW and R2E2 for the construction of SHPPs
- 60 SHPPs have been constructed by the private sector by the end of 2013.
- Totally 43.5 Mtoe electrical energy has been pumped to the network by the end of 2013 by the new constructed SHPPs

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Commercial loans of SHPPs

The following points were the reasons for successful development of SHPPs

- ✓ Careful research and planning of the sites
- ✓ Preparation of individual business plan for each power station and making the plans available to the investors
- ✓ Correct estimation of hydro potential
- ✓ Reasonable commercial financing from banks



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Policy incentives for developing SHPPs



- Guaranteed purchase of produced electricity within 15 years after commissioning /production license/
- Fixed tariff
 - SHPP /natural flow/ -19.551 AMD/kWh - \$0.048
 - SHPP /irrigation/ - 13.033 AMD/kWh -\$0.032
 - SHPP /drinking water/ - 8.69 AMD/kWh -\$0.021
- End user tariff /population/- 38 AMD/kWh (day)-\$0.093; 30AMD/kWh (night) - \$0.073



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Renewable energy roadmap



- Identifies economically and financially viable potential of renewable energy in Armenia
- Identifies short, midterm and long term targets for development of RE
- Outlines specific steps towards achieving above mentioned targets
- Targets set the priorities in the development of RE and the energy system such as energy independence, potential of reducing the energy costs, creation of high tech industries, environmental benefits etc.



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Scaling up Renewable Energy Program (SREP)



- The Government of Armenia requested Scaling-Up Renewable Energy Program in Low Income Countries (SREP) to support development of viable renewable energy technologies and projects
- Armenia has been selected as one of the six reserve countries for the SREP
- The objective of the SREP is to pilot and demonstrate the economic, social and environmental viability of low carbon development pathways in the energy sector by creating new economic opportunities and increasing energy access through the use of renewable energy



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Scaling up Renewable Energy Program (SREP)



- Each of the potential renewable energy resources were evaluated and prioritized against five criteria, which are
- cost-effectiveness of the technology
- potential for scaling up the technology
- maturity of the market
- potential for job creation
- effect of each technology on the stability of the grid.





Scaling up Renewable Energy Program (SREP)



Technology	Increased installed capacity from renewable energy	Increased access to energy through renewable energy	Low emission development	Affordability and competitiveness of renewable sources	Productive use of energy	Economic, social and environmental impact	Economic and financial viability	Leveraging of additional Resources	Gender	Co-benefits of RE scale-up
Res. geothermal heat pumps	1	1	2	1	2	1	2	1	2	2
Solar thermal water heating	1	1	2	1	2	1	3	1	2	2
Fixed PV	1	4	2	1	1	2	2	1	4	3
Geothermal power	1	4	2	1	1	1	2	1	4	2
Small hydropower	1	4	2	4	2	3	1	4	4	4
Ag. biogas-to-power	1	2	1	3	1	1	1	2	4	1
LFG biogas-to-power	1	4	1	3	1	1	1	2	4	1
Pumped storage hydropower	1	4	4	4	4	4	4	4	4	4
Wind	1	4	2	1	2	2	3	1	4	2
Distributed solar PV	1	1	2	1	1	1	4	1	4	2





Scaling up Renewable Energy Program (SREP)



SREP IP has been already prepared according to which SREP resources of **\$40 millions** would mainly be used to

- develop roughly 40-50 MW of utility-scale solar PV utilizing the financing scenario of 35% commercial loan, 35% concessional loan and 30% private investment
- Explore Armenia's most promising Karkar geothermal site
- Catalyze private investments up to \$130 millions



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Solar water heating

- Solar thermal technologies become more and more popular in Armenia
- It is already few years that the banks started to provide commercial loans for residential and commercial scale solar water heaters
- There are around 5MW solar thermal installations known in Armenia



Solar water heating

- It is proved that evacuated tube heat pipe thermosyphone solar water heaters work the best in the continental climate of Armenia which provide around 2,5 years of simple payback period
- 8 MW solar thermal installations are expected during the next 5 years





Renewable Resources and Energy Efficiency Fund

Thank You



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