INFORSE-Europe Sustainable Energy Seminar
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Nordic Folkecenter for Renewable Energy, Denmark

INFORSE-EUROPE
International Network for Sustainable Energy

Transition Towards Sustainable Energy – Armenia

by Artashes Sargsyan; August 21, 2017
EcoTeam

See the Program and the Proceedings at: http://www.inforse.org/europe/seminar_17_DK.htm

Strengthening civil society to advocate for sustainable energy transition Project

“EcoTeam” Energy and Environmental consulting NGO, Armenia

Project duration: August 2016-October 2017

Project ASET is implementing by several NGOs from Denmark (OVE, INFORSE), Belarus (NGO Centre for Environmental Solutions(CES)), Macedonia (Eco-Swest), Serbia (NGO SEKOR), Ukraine (NGO Renewable Energy Agency(REA)), Armenia (NGO EcoTeam).

Funding is provided from CISU (Denmark) through OVE (Denmark)

Results by EcoTeam and project by now

- Assessment of renewable energy resources potential and level of introduction in Armenia (2017 update in english) is prepared

- Draft recommendations on renewable energy develoment are prepared

-Seminar on sustainable energy was organized in Yerevan with participation of local NGOs at which Gunnar Olesen also participated and presented scenario “100% Renewable energy use in Armenia by 2050”

- Scenarios of RENEWABLE ENERGY DEVELOPMENT
are under way and one Draft Scenario was prepared with help of INFORSE

- Draft Scenario is translated into Armenian and put on the WEB site

Armenia Electricity Production Balance

Armenia has no own resources of fossil fuel and imports oil and gas mainly from Russia and, to a lesser extent, Iran. Domestic demand for electricity is completely satisfied with electricity generated at domestic power stations.

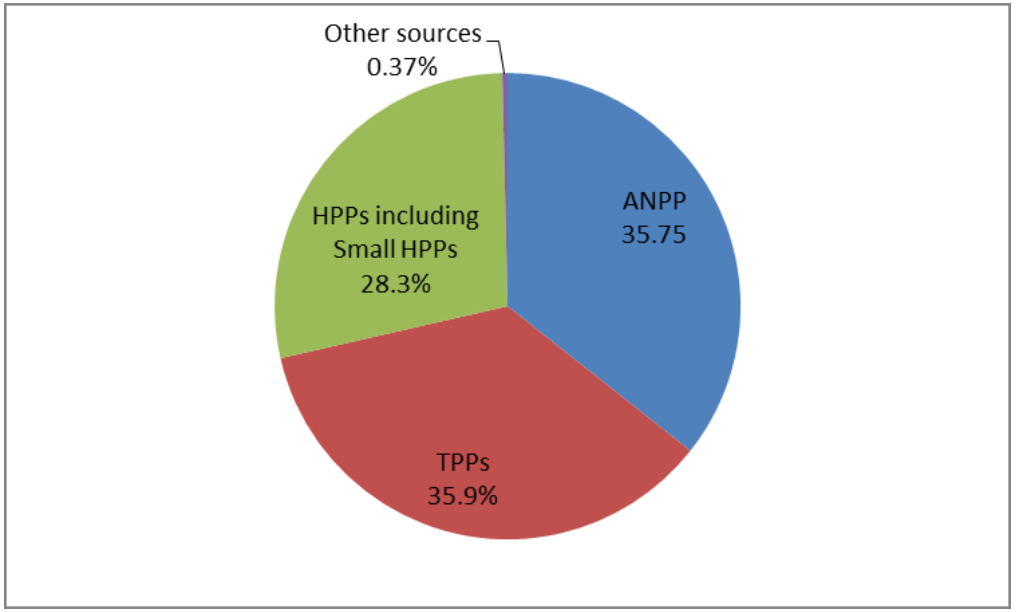


Fig. 1. Shares of ANNP, TPPs, HPPs in total annual electricity production in 2015

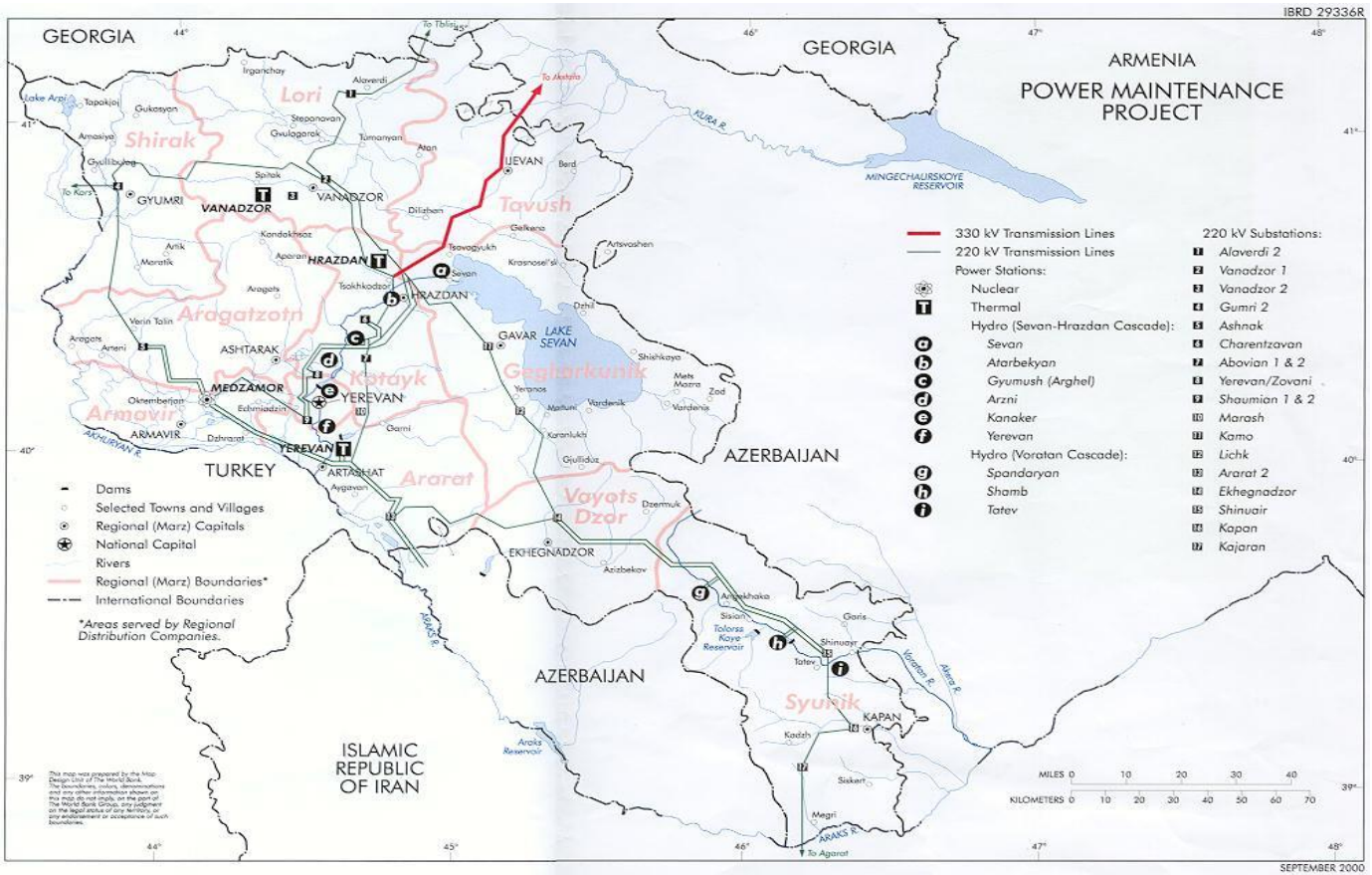


Fig. 2 Power System of Armenia, Map

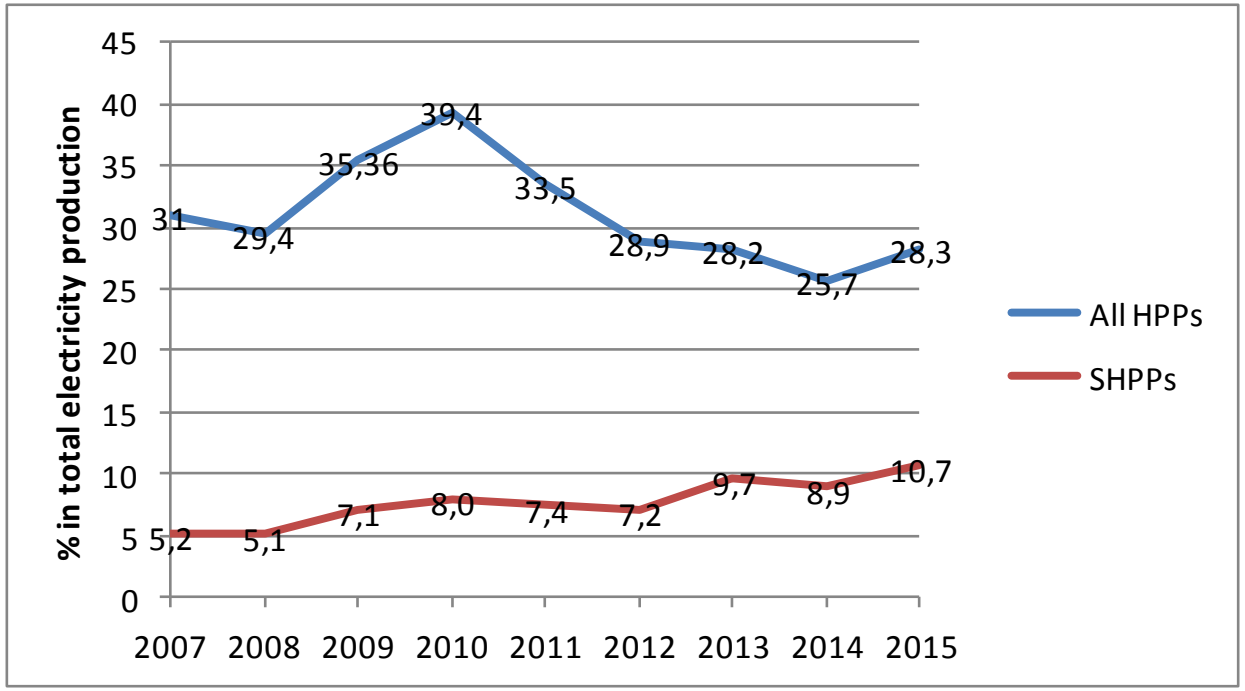
Source: Global Energy Network Institute

Table 1. Current capacities and GoA planning of introduction of new renewable capacities in 2025 and 2036 according to “Long-term (up to 2036) development pathways for RA energy sector [2]”

Type of renewables	2015	2025[2]	2036[2]
	Current Capacity (MW)	Cumulative Capacity (MW)	Cumulative Capacity (MW)
Solar (grid connected)	< 0.200	40	70
Wind	2.64	-	200
Geothermal	0	30	30
Small hydro	313	402	402
Large& Medium HPPs	960	1093	1223

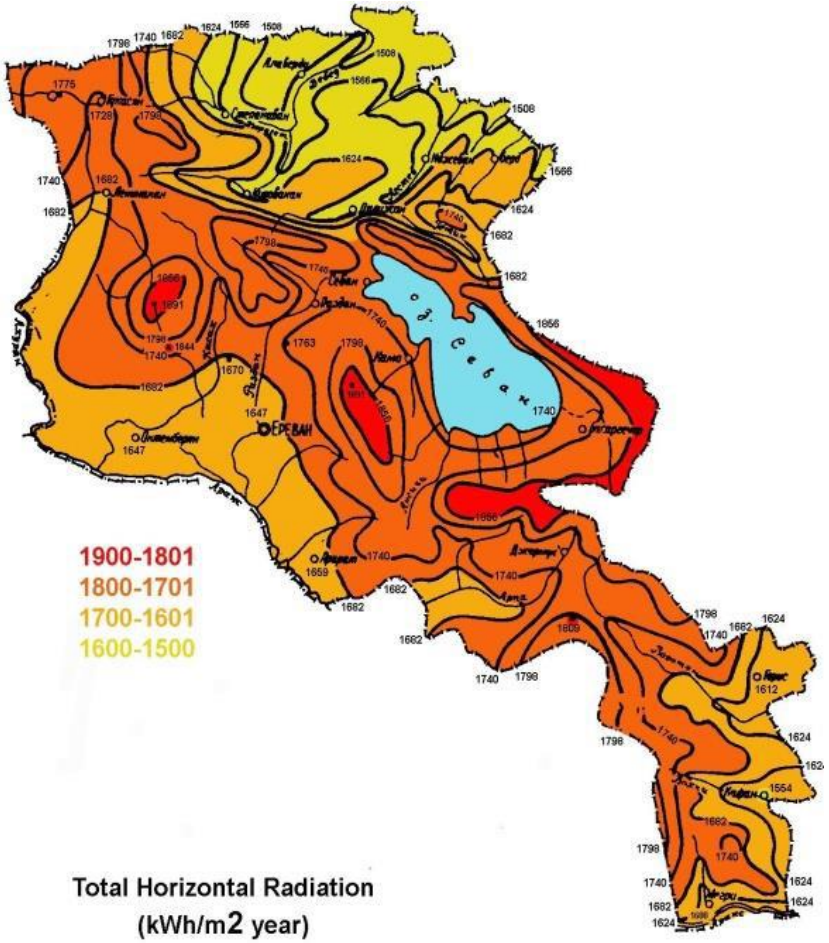
GoA new approaches on PV

- In the end of 2016 GoA adopted new approaches to stimulate solar PV development and in its decision it proposed to consider to construct PV stations in Armenia with total capacity up to 110 MW. This new approach takes into account 80% reduction of prices on solar PV panels from 2011 to 2015 years. Feed-in-tariff on solar photovoltaic in the amount of 42.645AMD/kWh (VAT excluded) was introduced in November 2016.



- Fig. 1 Share (in %) of all HPPs including small HPPs (upper curve) and share (in %) of small HPPs in total annual electricity generation from 2007 to 2015.

Feed-in-tariffs (VAT excluded) in AMD for grid connected RES								
		Duration of support	2011	2012	2013	2014	2015	2016
Small Hydro Power stations	Natural water streams	15 years	19.28	19.551	20.287	21.061	21.168	23.753
	Irrigation systems	15 years	12.853	13.033	13.523	14.039	14.110	15.832
	Natural drinking sources	15 years	8.57	8.690	9.017	9.361	9.308	10.556
Wind		20 years	33.756	35.339	34.957	37.007	38.005	42.645
Biomass		20 years	36.928	37.447	35.856	40.338	40.642	42.645
Solar	More than 150kW, less than 1MW	20 years						42.645

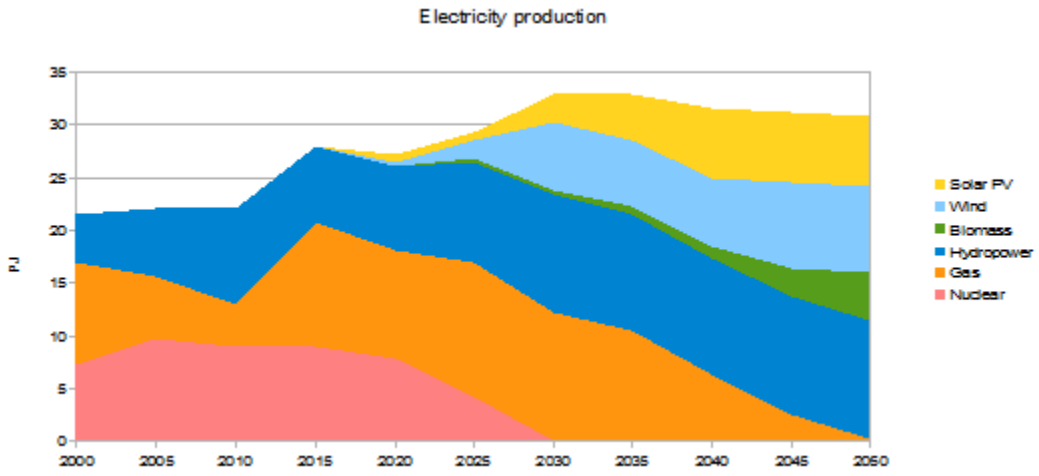


Total Horizontal Radiation
(kWh/m2 year)

Figure 4. 95kWp PV station in Armenia was installed in Gyumri in 2014 by Caritas Armenia NGO

Table 16. RENEWABLE ENERGY POTENTIAL BY TECHNOLOGY [Update of SREP as of Sept. 2013]

Technology	Capacity, MW	Generation, GWh/yr
Wind	795	1,640
Solar PV	835-1,169[a]	1,735-2,118[a]
Concentrating Solar power	1,169	2,358
Distributed solar power	93	128
Geothermal power	31-54	244-436
Landfill gas	2.5	19
Small hydropower	91	334
Pumped storage hydropower	150	1,161-1,362[b]
Biogas	3.3	26
Biomass	29	228
Total electricity	**1,876-2,208**	4,358-4,921
Solar thermal hot water	n/a	254
Geothermal heat pumps	n/a	4,423
Total (heat)		4,677


Electricity production
PJ
35
30
25
20
15
10
5
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
Solar PV
Wind
Biomass
Hydropower
Gas
Nuclear

FINDINGS and RECOMMENDATIONS

1. Armenia completely covers its internal market needs in electricity with power stations located on its territory, with that to operate TPPs all natural gas is imported from Russian Federation and IRA and to operate ANPP nuclear fuels is brought from Russian Federation.

2. Armenia should strengthen its relations with European Union through Energy Union framework to improve its energy. Corruption risks should be minimized to open the national energy market for investors and allow open and fair competition among them.

FINDINGS and RECOMMENDATIONS

3. Armenia should concentrate efforts on development of investments projects of large and medium-size HPPs: Lori-Berd HPP with 60 MW capacity, Shnogh HPP with 75 MW capacity, Meghri HPP with capacity of 100-130 MW till 2025, construction of wind power plants with total capacity of up to 200 MW, geothermal power plant (30MW). We would now suggest 120 MW PV station to be constructed instead of planned 40MW PV station by 2025.

4. Improvement of energy efficiency and development of renewable energy resources are priority for EU and, as it was declared, also for Armenia and that gives hopes for successful cooperation between them. Significant efforts should be done to realize this interest not only on words but in practice.

FINDINGS and RECOMMENDATIONS

5. Potential of small HPPs will be realized shortly. Share of existing all HPPs including small HPPs, can not be increased significantly due to only construction of small HPPs. Total share of all HPPs even reduced within last years.

6. It is desirable to utilize software programs to implement energy forecasts that are possibly less developed compared with Markal software but they don’t require so many input data and are free.

7. Better tariffs policy regulation, including larger difference between daytime and nighttime tariffs for residential sector, will stimulate introduction of market oriented energy saving appliances.

FINDINGS and RECOMMENDATIONS

8. Armenia can acquire access to regional electricity market. There are national targets to increase capacity of 400kV electricity transmission lines between Armenia and Georgia from 200 MW to 700 MW, and capacity of 400 kV electricity transmission lines between Armenia and IRI from 300 MW to 1000 MW. B2B transformer will be constructed

9. To be competitive on regional energy market Armenia should reduce its technical and commercial losses within electricity distribution companies from current 11-13% to at least two times less i.e. close to figures in European electricity distribution companies.

10. There exists high scientific and research potential in Armenia in the area of renewables that can be used abroad for developing RE projects and which unfortunately is still not realized enough. Horizon 2020 program (in the area of Research, Innovation and Competitiveness) and similar programs can serve a good starting point for that.

11. It seems reasonable to re-evaluate renewable energy potential in Armenia regarding biogas and biomass use.

12. GoA outlined plans to develop renewable energy sources. To reach successes in that direction amendments in «Energy saving and Renewable energy» law are required as its current version don't reflect the demand in renewable energy sources and current legislation in EU. Historically it was designed only as energy saving law and already during development Ministry of Finance rejected to provide financial support to that law. So the law has declarative nature in its essence. It is reasonable to have separate law on renewable energy, provide financial support through Ministry of Finance with involvement of bilateral donors and multilateral donors with purpose to develop in first turn solar, wind, biogas and geothermal energy sources. The appropriate financial foundations should be organized to promote renewable resources excluding small hydro at no more than 6-7% long-term (10-15 years) loans for development and installations of these sources

Thank you

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