



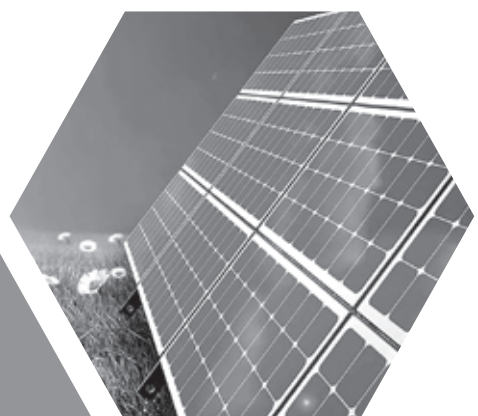
ENERGY

INDUSTRY OVERVIEW

KEY FACTS



3313.2 MW
installed capacity



2500+ hours,
which is 307 days of
sunshine yearly

Guaranteed purchase
of produced
renewable energy
(Feed-in tariffs)

Solar energy flow of
horizontal surface is
1750kWh (Europe average
being 1000kWh)

High competitiveness
in manufacturing
metallurgical silicon
(up to 1000 t/year)

A wide variety of
siliceous raw materials

INDUSTRY OVERVIEW

Energy production volume growth in kWh in 2017



RENEWABLE

+36.8%

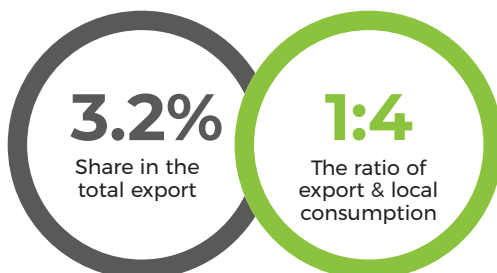
2017 compared with 2014

ENERGY	Number of Energy Plants in Armenia (2017)	Installed Capacity of Energy Plants, MW (2017)
NUCLEAR	1	408
THERMAL	3	1561.7
COGENERATION THERMAL PLANTS	3	14
HYDRO CASCAD	2	964
RENEWABLE (SHPP, Solar, Wind)	192	365.6

Source: Ministry of Energy Infrastructures & Natural Resources of the RA & R2E2 Fund

ENERGY EXPORT

Export in 2017



+15%

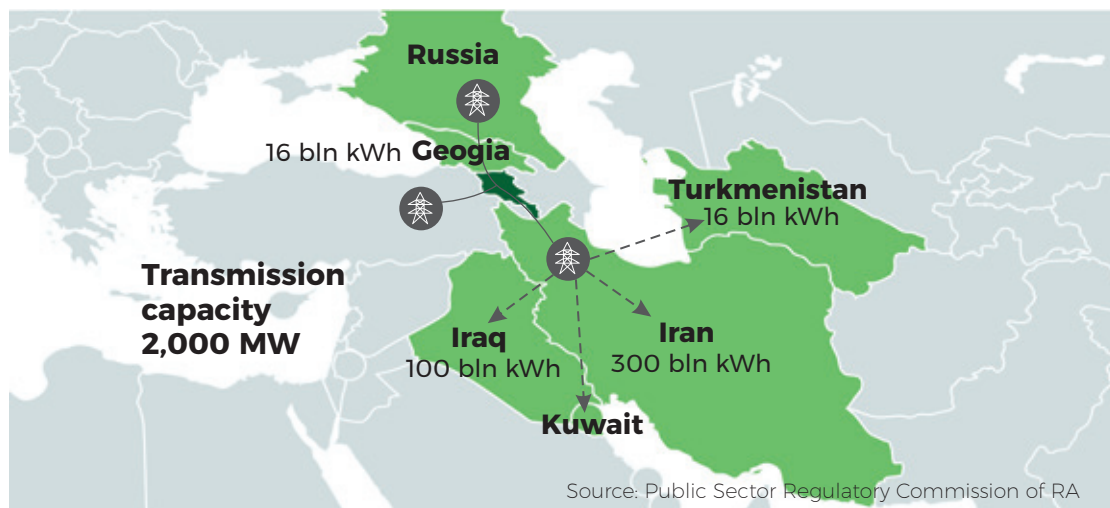
GROWTH RATE (kWh)

+16.5%

GROWTH RATE (USD)

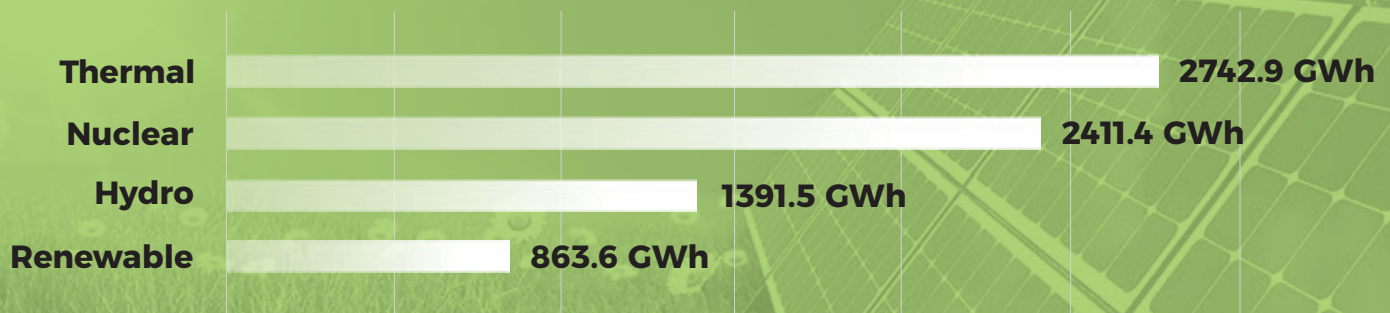
- Exports grew 13.1% (kWh) in 2017 compared with 2014
- 90.6% of energy is exported to Iran
- Exports to Iran increased by 2.4% (kWh) in 2017 compared with 2014

Armenia's transmission capacity



PRODUCTION

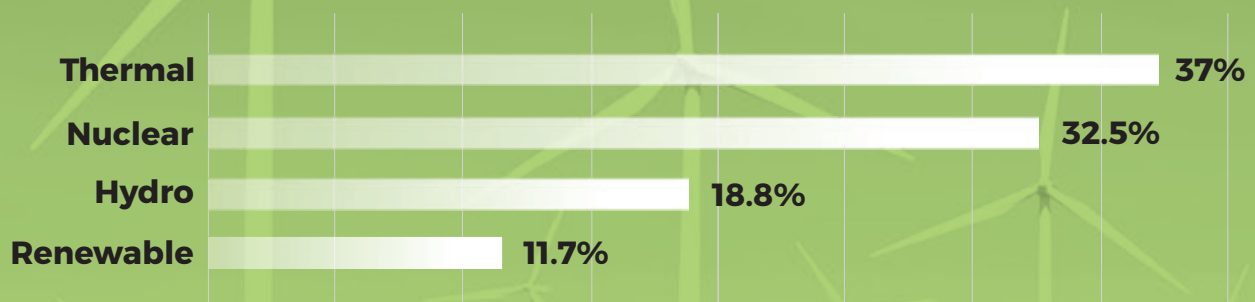
USEFUL ENERGY PRODUCTION IN GWh IN 2017



Source: Ministry of Energy Infrastructures & Natural Resources of the RA

- Nuclear power plant (PP) experienced the highest growth among traditional energy sources, with an increase of 6.4% in 2017 compared with 2014
- The share of electric power generation, transmission and distribution in the total production is 13%
- The transmission system (High-voltage Electric Network of Armenia) produces 220 kW of energy, 32% of the total market share
- The distribution system (Electric Network of Armenia) produces 0.4-110 kW energy, 68% of the total market share
- \$3.5/hour is the average wage in the manufacturing

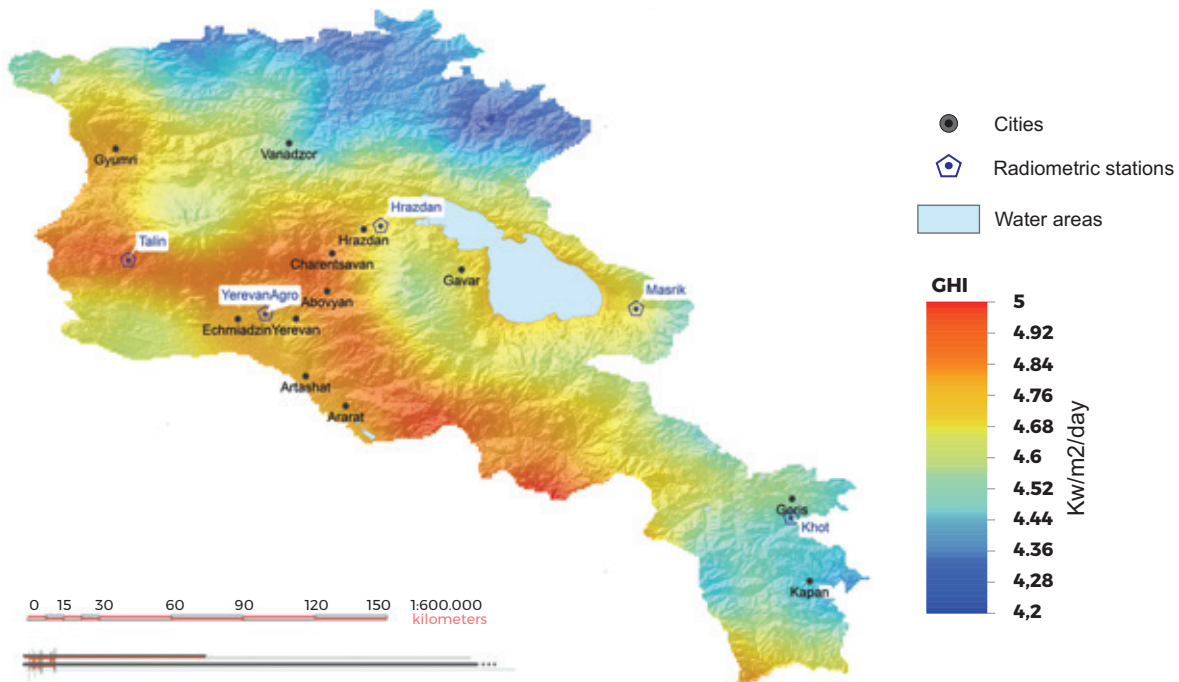
USEFUL ENERGY PRODUCTION SHARE BY SOURCES IN 2017



Source: Ministry of Energy Infrastructures & Natural Resources of the RA

RENEWABLE ENERGY POTENTIAL IN ARMENIA

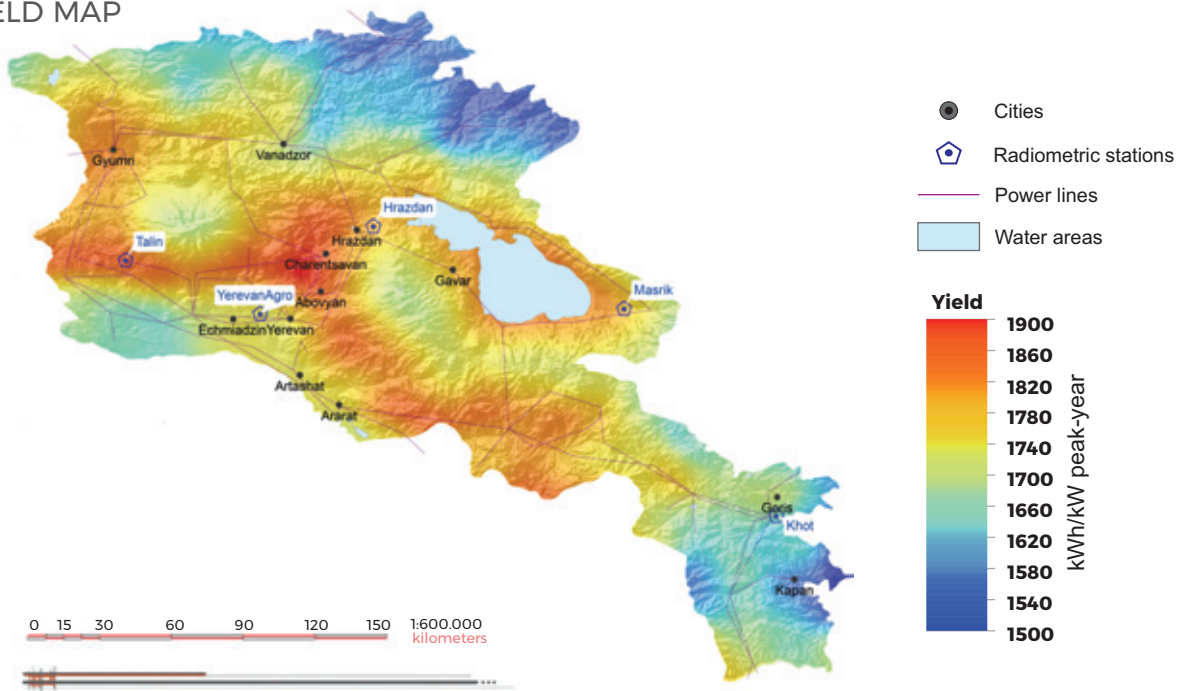
GLOBAL HORIZONTAL IRRADIATION MAP



Source: Ministry of Energy Infrastructures & Natural Resources of the RA

Direct Normal Irradiation (DNI): $4.4\text{-}6.3 \text{ kWh/m}^2/\text{day}$
 Global Horizontal Irradiation (GHI): $4.2\text{-}5 \text{ kWh/m}^2/\text{day}$
 Global Tilted Irradiation (GTI): $4.7\text{-}5.7 \text{ kWh/m}^2/\text{day}$
 PV Yield: $1500\text{-}1900 \text{ kWh/kW peak-year}$

PV YIELD MAP



Source: Ministry of Energy Infrastructures & Natural Resources of the RA

BUSINESS ENVIRONMENT

DOING BUSINESS 2019



OUT OF 190 COUNTRIES

Source: World Bank, Doing Business Database

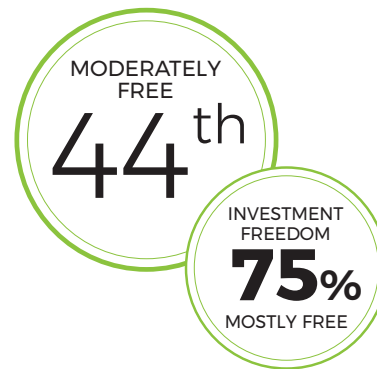
Takes 3 days to open a company, 7 days to register property

Efficient e-governance services in place

100% foreign ownership permitted

No restrictions on investment sectors

ECONOMIC FREEDOM INDEX 2018



OUT OF 180 COUNTRIES

Source: Heritage Foundation Database

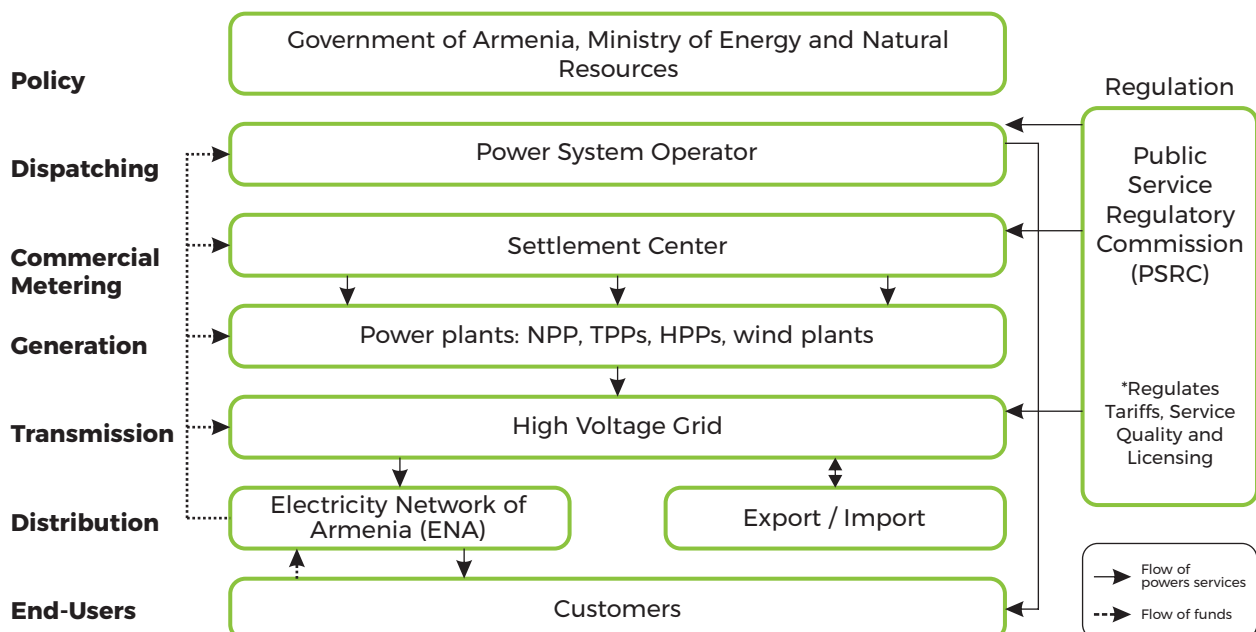
Five-year investment protection from changes in legislation

Free exchange of foreign currencies and repatriation of profit

Well-regulated banking system

Foreign companies registered in Armenia have the right to buy land

STRUCTURE OF THE ELECTRICITY SECTOR



Source: Ministry of Energy Infrastructures & Natural Resources of the RA

RENEWABLE ENERGY CAPACITIES

- Solar: The total resource potential for utility-scale solar PV is over 6500 MW
- Wind: Measured capacity is more than 800 MW
- Geothermal: Measured capacity of the first site is 30 MW
- Hydro: Upgrading SHPP with the total capacity of 400 MW
- Biomass: Annual potential for receiving biomass is about 135 million m³

WIDE RANGES OF INCENTIVES

Well-designed reforms enable private sector involvement in renewable energy technology development

- The Armenian government emphasizes the importance of renewable energy and energy efficiency in addressing energy security
- The government supports in prioritization of the sector for new investments
- Unbundling and privatization of the energy sector since 1995
- Establishment of the sector Regulator
- Supporting financial sustainability: Installing meters, Bringing tariffs to cost recovery levels, Increasing transparency in collections and billing

Favorable laws and regulations

- The government guarantees to purchase with feed-in tariffs of all electricity produces by renewable plants for the next 20 years
- The government guarantees to purchase with feed-in tariffs of all electricity produces by small hydro plants for the next 15 years
- Feed-in tariffs (excluded VAT) for small PPs are adjusted based on inflation and exchange rate
- Common energy market with Eurasian Economic Union (Republics of Armenia, Belarus, Kazakhstan, Kirgizia and Russian Federation)

MARKET STRENGTHS

- The open and competitive bidding process in the energy is carried out by the government of Armenia to pick investment projects
- The stability of energy sector in Armenia is more typical for developed countries
- A wide variety of siliceous raw materials of numerous genesis and morphology
- Highly competitive in silicon and polysilicon manufacturing
- 200 small rivers
- Favorable climate conditions
- Professionals with extensive scientific and engineering expertise
- Cost-effective workforce

ONGOING PROJECT / MASRIK - 1 PV PP

The winner of the Masrik -1 PV PP project was renounced “Fotowatio Renewable Ventures B.V” (FRV) and “Fotowatio, S.L.” (FSL) consortium under the free competition. The PV plant is located in Gegharkunik region of Armenia. Peak power of the plant is 62.00 MWp. Annual production is going to be 150000 MWh/year. This project will help to avoid the CO₂ by 54000 t/Year. The renewable energy produced by Masrik - 1 PV PP will supply 21400 households. The surface of the plant will use 100 hectares. The Masrik - 1 PV PP is going to start its operation in 2020. The project is under the development phase. Fotowatio Renewable Ventures B.V company is responsible for the project's development and financing. The company is at the forefront of the transition of the energy market, as it increasingly shifts its focus to renewable solutions. It is inspiring this change by setting high standards of quality, technical innovation and commitment to delivery.

ONGOING PROJECT / ACCIONA ENERGY GLOBAL SL

By the Memorandum of Understanding signed on March 30, 2017 between the Ministry of Energy Infrastructures and Natural Resources of RA and “Acciona Energy Global SL” Spanish company on Wind Power Plant Construction Program in Armenia, it is foreseen to construct wind power plants with capacity of 100-150 MW. In December 2017, the company started implementation of the wind potential assessment. Two 80 meter height Wind Monitoring Stations and one “Sodar” system were installed. Each station is equipped with 8 anemometers, 3 weathercocks, 2 thermo hydrometers and 1 atmospheric pressure gauge.

ONGOING PROJECT / ACCESS INFRA CENTRAL ASIA LIMITED

According to relevant decision of the government of Armenia dated March 30, 2017 an assistance is provided to “Access Infra Central Asia Limited” United Arab Emirates Company for construction of wind power stations in Armenia with capacity up to 150 MW. An 80 meter height Wind Monitoring Station is in action. Another one is planned to be installed in 2018.

SUCCESS STORY / OPTIMUM ENERGY

Starting from 2013, Optimum Energy creates value for clients by successfully harnessing the expertise of more than 20 highly skilled multi-disciplinary engineers for design, delivery, and operation of high quality sustainable energy, energy efficiency, and renewable energy solutions. The company has knowledgeable international and local staff and acts as a distributor for many well-known manufacturers and suppliers all over the world in the field of energy efficiency, renewable energy, efficient HVAC & BMS systems and efficient lighting. Optimum Energy is focused on providing optimal and efficient energy solutions for commercial and residential buildings, small, medium and large enterprises, as well as industrial scale projects and infrastructures.

SUCCESS STORY / ZOD WIND

“Zod Wind” CJSC has planned its 20MW wind energy project at Zod pass area, Armenia, east of Lake Sevan. The project addresses effective use of wind energy potential in the region and development of electricity production from renewable energy sources. The aim of the project is to provide energy and environmental security, reduce the dependency of Armenia on imported organic fuels, and strengthen the country's energy independence.

The study conducted by the German company Lahmeyer Int'l GmbH indicates the annual average wind speed of the site is about 8.2m/s on 50m height and net electricity generation potential is over 54 million kWh/year. “Zod Wind” has rented a land of 200 ha for the construction of the power station and has received permission to connect to the network.

Currently, the company has completed the installation of two 660 kW wind stations (with overall 1.32MW) and is preparing for the project. Project plan has been approved by environmental and technical experts.

SUCCESS STORY / PROFPANEL (SOLARON)

Profpanel LLC was founded in 2012, but established its production of solar panels later in 2016. The company is the first and so far only manufacturer of solar panels in Armenia. Its annual production capacity reaches about 10 MW.

The brand "Solaron" is a registered trademark for products manufactured by Profpanel. The manufacturing process corresponds to international standards, which allows the company to adapt to customer requirements and offer high-quality products.

- Design and calculation of solar system
- Installation and operation of solar system
- Consulting
- Organizing trainings
- Providing information on funding sources



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