PHOTOVOLTAIC AND WIND ENERGY IN GEORGIA AND ARMENIA

framework and conditions to implement renewable energy projects
This publication is published by
WECF - Women Engage for a Common Future e.V.

www.wecf.org

Munich, November 2018

Authors: Katharina Habersbrunner, Nina Leuteritz
Layout: Nina Leuteritz

www.wecf.org
Women Engage for a Common Future

Acknowledgements

This publication was financially supported by Grüner Strom Label e.V., Urbis Foundation, GLS Stiftung Neue Energie and Clean Power Europe SCE, Brussels.
The contents of this publication are the sole responsibility of WECF and can in no way be taken to reflect the views of Grüner Strom Label, Urbis Foundation, GLS Stiftung Neue Energie and Clean Power Europe SCE.
Content

1. Legal framework for wind and solar energy  4
2. Political will to push wind and solar  5
3. Linkages between renewable energy targets, the Paris Agreement and the Agenda2030  6
4. Funding structures and support programs  7
5. Political / economical structures which hinder establishing solar and wind energy  8
6. Potential of wind and solar  9
7. Existing solar and wind projects  13
8. Main drivers of wind and solar projects  15
Photovoltaic and wind energy in Georgia and Armenia

Framework and conditions to implement renewable energy projects

The publication gives a short overview about the framework and conditions to implement small scale renewable energy projects.

Legal framework for wind and solar energy

Georgia

According to the Ministry of Energy of Georgia, the country aims to gradually adjust their energy legislation according to the EU legislation in order to realise the potential of the country’s renewable energy resources. Changing the energy market to allow more competition and providing more transparency, growing the relationship between Georgia and the EU countries concerning energy trade and supporting projects and activities that contribute to a better energy efficiency are part of the transition towards clean energy production and consumption. In this context, a regulation was introduced to integrate renewable energy into the electricity grid. Also, since 2017 it has been possible for consumers to purchase their needed electricity from any provider and with this consume directly under certain conditions. Additionally, there were already energy cooperatives established in cooperation with the “Clean Energy Umbrella Cooperative”, supporting a policy framework for renewable energies on a political level.

- (WECF, Energy cooperatives – Comparative analysis in Eastern Partnership countries and Western Balkans’
Armenia

Passed in 2004, the law on “Energy Saving and Renewable Energy” is one of the two main legal acts for renewable energy. Aiming to make Armenia more independent concerning energy production and establishing the industry infrastructure needed to develop renewable energy. The other important law is the “Energy Law” that was passed in 1997. While issues that are related to energy in general are mainly regulated by the Energy Law, the Law on Energy Saving and Renewable Energy is focused on specific issues related to renewable energy. Main aspects that are defined by these laws are the principles of the state’s policy on developing renewable energy resources, by using local and alternative resources of energy and creating new industries to develop this sector. Taking into consideration international best practice and strategies to tackle arising problems, the draft of the new Law on Energy is planned to be elaborated by the Armenian government by 2020.

- https://hetq.am/static/content/pdf/Renewable_Energy_in_Armenia_9741.pdf

Political will to push wind and solar

Georgia

The Georgian government aims to develop the use of renewable energy sources such as wind and solar energy. An example is the participation of governmental bodies in “The Conference on Renewable Energy” that was held in April 2018 by the EU-Georgia Business Council. The main discussion was about energy projects in Georgia that contribute to the development of renewable energy usage. On the other hand, as the country’s electricity relies mostly on hydro based production, the negotiations about tariffs for renewable energy are tough and a decision has not been made yet. However, this decision is needed to push wind and solar projects.

- http://www.infinite.ge/2019/04/24/the-conference-on-renewable-energy-finished-successfully/
Armenia

The development of solar and wind energy is an important target for the government of Armenia. It has applied the Scaling-up Renewable Energy Program (SREP) for low income countries in order to develop solar photovoltaic technology. Also, in June 2014 the Renewable Energy Investment Project was approved. The government aims at integrating and sustainably developing the renewable energy sector by a full and efficient use of renewable energy sources and by the implementation of modern technologies.

- [link](http://k2e2.am/en/projects/renewable-energy-projects/)
- [link](http://www.noravank.am/upload/pdf/540_en.pdf)

### Linkages between renewable energy targets, Paris Agreement and Agenda2030

Georgia

Georgia shows commitment in achieving different climate targets with the NDCs (Nationally Determined Contributions), the Declaration on Green Growth, the Low Emission Development Strategy (LEDS) and the National Energy Efficiency Action Plan (NEEAP).

The country’s NDCs provide guidelines for the reduction of GHG emissions, aiming for a reduction of 15%. Due to a global agreement this goal will be increased to 25% below the Business as usual scenario (BAU). With this, a stay of 40% below 1990 levels by 2030 would be secured. Even though Georgia only contributes a small share in global emissions, it wants to take part in tackling climate change. The aim to mitigate CO₂ emissions and to establish a better and more efficient use of renewable energy resources goes in line with the Paris agreement and the Agenda 2030.

- [link](https://ministryofenvironmentandnaturalresources.gov.ge/)
- [link](https://ec.europa.eu/leds/en)
- WECF „Energy cooperatives—Comparative analysis in Eastern Partnership countries and Western Balkans”
- [link](http://www.oecd.org/environment/outreach/Georgia%20Climate%20Action%20%5Dweb%5D.pdf)
Armenia

The Paris Agreement was signed and ratified by the Republic of Armenia on 23rd March 2017. There are about 20 cities of Armenia that signed an agreement of the Mayors of the cities. Also, the Agenda 2030 is supported by the country’s government which is promoting the development of renewable energy sources. Armenia has the target to achieve ecosystem neutral GHG emissions by 2050. In 2015 the share of renewable energy of all primary energy was about 16%. The aim is to reach 21% by 2020 and 26% by 2025. This increase shall mainly be achieved by hydro-based energy production but also by geothermal, solar and wind power.

- WECF. „Energy cooperatives – Comparative analysis in Eastern Partnership countries and Western Balkans“

Funding structures and support programs

Georgia

The importance of climate action is undisputed and some financial resources have been made available. Currently investors such as commercial banks, companies and investors are, however, mainly interested in hydropower. The main financial sources are the government and state-owned enterprises, which could set more attention to the government’s green growth agenda. Promoting this and making more competition possible on the Georgian electricity market could help renewable energy find its way into the market. Yet, the current funds that have been allocated to climate action are most likely insufficient to achieve the country’s overall climate goals.


Armenia

The development of renewable energy and technologies for energy-saving measures is supported by some banking structures in Armenia, but as the yield rates are low they are not very appealing to investors. However, while wind energy can be attractive in Armenia, bigger investments remain absent. The high costs for installation of wind power plants might contribute to that as well as technical and economic barriers. Especially the installation of electric power lines at remote locations to get renewable energy integrated into the grid is rather expensive.

- https://hetq.am/static/content/pdf/Renewable_Energy_in_Armenia_94741.pdf
Political/economical structures which hinder establishing solar and wind energy

Georgia

The passive acting of Georgia’s government towards solar and wind energy is making it difficult to develop a green capital market. The public financial sector has a big impact on establishing these forms of energy production, such as by attracting climate-related investments from the private sector due to favourable financial conditions. It is the government’s responsibility to put some effort into promoting green growth aspects for different enterprises for instance by offering benefits for using renewable energy. The monopolistic structures of energy utility companies do not push the ambitious development of renewable energy.

Looking at the economic situation, the focus in energy production and investments relies on hydro resources, the biggest of Georgia’s natural resources. The annual potential capacity of the significant rivers for energy production is about 15,000 MW – which exceeds the potential capacities of wind and solar energy and is making them less attractive.


Armenia

The Armenian industry for renewable energy is not as developed as the traditional energy industries. There are only some smaller hydro-based power plants that can compete with traditional plants comparing economic measures. However, solar photovoltaic power technology has become more competitive recently. Renewable energy produced from other sources must be supported by related law and policies as the existing ones do not help enough to develop a favorable regulatory environment. There is more encouragement by the government needed as well as better conditions for private investors to push the renewable energy sector.

Source: https://upload.wikimedia.org/wikipedia/commons/thumb/d/d3/Electricity_Production_in_Armenia_by_Power_Plant_2006.png/350px-Electricity_Production_in_Armenia_by_Power_Plant_2006.png
Another issue are photovoltaic solar panels for power production since the import of solar cells and their installation is costly and currently there are only a few small solar panel manufactures in Armenia. Therefore, this industrial base needs to be developed in order to be independent on foreign production. Additionally, there exist some smaller organisational problems, such as the difficulty of using agricultural land for energy production.

- https://hetq.am/static/content/pdf/Renewable_Energy_in_Armenia_917-81.pdf

### Potential of wind and solar

**Georgia**

**Solar energy potential in Georgia**

Around 80% of total electricity is generated from hydro based resources. Yet, the country has also a high potential for other renewable energy resources. It has sunshine levels that are above average comparing to other EU countries, providing the perfect conditions for the use of solar energy. It is evaluated that Georgia’s total solar energy potential is around 108 MW.

![Solar Resource Map](https://solargis.com/mapsandgisdatal/download/georgia)
Wind energy potential in Georgia

Looking at wind energy, the country can be divided into four parts which differ in their wind speed from 2.5 m/s up to 9.0 m/s. There are some parts in the mountain ranges of the country that cannot be used for wind power farms, but many others can. Recent studies on wind energy have shown high potential of an annual power generation of up to 4 GWh.

Source: https://globalwindatlas.info/area/Georgia

Armenia

Solar energy potential in Armenia

Although Armenia has a high potential for the use of solar energy with its geological location in the subtropical zone, due to the high costs the country cannot afford installing it. According to USAID (2007) about 100 MW is a good calculation for usable solar energy capacity in 2020 with a total investment of about 250 million USD.

Source: https://solargis.com/maps-and-gis-data/download/armenia
Wind energy potential in Armenia

In general, the country has a high wind energy capacity, but only a small share of it can be used for energy production. This is partly related to the fact that many areas cannot be accessed easily by the heavy vehicles and machinery which would be needed to carry and install the wind turbines. There are some mountain passes with wind speed up to 7m/s, making them suitable for the construction of wind power plants. The wind energy potential of Armenia is estimated to be 250-400 MW.

- https://hetq.am/static/content/pdf/Renewable_Energy_in_Armenia_91741.pdf
**Existing solar and wind projects**

**Georgia**

Currently there is one wind farm in Georgia that is already producing energy. The commissioning of the farm named “Qartli” was in 2016. It has a capacity of 20.7 MW and about 31 Million USD were invested in this project by the JSC “Georgian Energy Development Fund” (50.1%) and the JSC “Georgian Oil and Gas Corporation” (49.9%).

There are some other projects that have not had their completion yet - most of them are depending on negotiations concerning the tariff. The “Central Wind Energy Power Station” with a capacity of 120 MW and a total investment of 200 Million USD is one of the bigger projects. The investors are “Calik Enerji Sanayi Ticaret A.S.” (85%) and the JSC “Georgian Energy Development Fund” (15%). The preparations for this project have started in 2016 as well as for the “Nigoza Wind Energy Power Station” with the same investors as for the “Central Wind Energy Power Station” and a capacity of 50 MW. For this project about 66 Million USD were invested. The windfarm “Zestaponi Wind Power Station” also has a capacity of 50 MW. In this project about 60 Million USD were invested by Ltd. “Geocraft” (90%) and the JSC “Georgian Energy Development Fund” (10%). The project has already been agreed and approved by the government, only the signing remains. The 420 MW wind farm project “Imereti” is another big project worth mentioning. It was proposed by the company “Infinite Energy”. The relevant negotiations with the government are ongoing.

Looking at the solar projects there is only one solar plant planned and that is the “Udabno Solar Power Station” with a capacity of 5 MW. This will be the first solar plant in Georgia and the JSC “Georgian Energy Development Fund” has invested 4.8 Million USD in this project that started with first planning in 2016.

- [http://www.infinite.ge/imereti-wpp/site-location/](http://www.infinite.ge/imereti-wpp/site-location/)
- [https://www.thewindpower.net/windfarm_en_23805_kartli.php](https://www.thewindpower.net/windfarm_en_23805_kartli.php)
Armenia

For the preparation of more solar power projects, a solar map of Armenia was created, and 6 community-owned sites have been selected as suitable for solar power plants. In several stages the construction will be carried out, starting with “Masrik 1” plant on the first stage. This project is currently under construction, has an estimated installed capacity of 46 to 55 MW and will be connected to the distribution network. The preparation for this solar energy project was done by “R2E2 Fund” and it is mainly supported by the “Scaling-Up Renewable Energy” Program (SREP).

Source: http://minenergy.am/en/page/545

About 3.2 Million USD were funded by Iran to implement the only operating windfarm in Armenia with an installed capacity of 2.6 MW. It was completed in 2005 and supported by the Iranian company “Sunir”. There are several other projects being drafted, for example the construction of 20 and 80 MW wind farms, but most of the construction projects for wind power plants have not been implemented yet. The Armenian Government wants to develop new legal acts until 2022 in order to support especially private wind power projects.

Main drivers of wind and solar projects

Georgia

The Ministry of Economy and Sustainable Development of Georgia is one of the main drivers of wind and solar projects in this country. It has founded the JSC “Georgian Energy Development Fund” in 2010 that invests a lot into the development of new wind and solar projects. The fund’s shares are all owned by the state.

The second important driver is the “National Energy and Water Supply Regulatory Commission”. It supports many projects related to energy and water, for example the “USAID Energy Program”, that contributes to the grid integration of energy coming from renewable sources. The non-governmental organizations also implement best practices for renewable energy projects with public participation.


Armenia

In summary, there are state agencies and NGOs that try to push wind and solar energy. The “Renewable Resources and Energy Efficiency Fund” of Armenia, supports the development of diverse renewable energy projects and research. The World Bank and Global Environmental Facility is mainly funding it. Also, there are some international organizations that are involved in the development of renewable energy in Armenia and programs focused on efficient use of renewable energy sources, energy saving and adaption to climate change. Mostly they are part of a government ministry, the Armenian National Academy of Sciences or a university.

- https://hetq.am/static/content/pdf/Renewable_Energy_in_Armenia_947-31.pdf