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Occasional Policy Brief: The Need for Developing Alternative Energy Resources in the Context of Armenia-EU Relations Based on the Example of Introducing Solar Water Heaters

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Executive Summary

This research is dedicated to one of the most efficient types of renewable energy – the introduction of solar water heating technology in Armenia. This technology will facilitate the development of alternative energy, the reduction of the volume of imported fuel, an increase in the degree of energy independence and an improvement in the economic and environmental situation.

Energy security and the development of regional energy markets are two priorities of the European Union's Eastern Partnership (EaP) program – two priorities which have been shaped into a separate thematic platform within the framework of the EaP. This article aims to demonstrate how a specific program can significantly push forward those priorities in the case of Armenia.

The usage of solar energy is itself beneficial and is directly linked to the solutions of a number of development issues for Armenia. It allows households to have affordable water heating, which does not depend on imported energy resources and it is technically applicable first of all in those rural areas with particularly serious socio-economic issues.

In Armenia, it is possible to produce homemade systems for solar energy usage, which are less efficient compared to international standards, but are made using construction and domestic waste material, which also has a positive impact from an environmental point of view. Armenia has all the resources necessary for the industrial manufacturing of solar water heaters, which will have a positive role in strengthening Armenia's position in the regional energy market and can potentially make Armenia an economy that exports solar water heaters to the region.

The financial and economic analyses and facts collected as part of this research suggest that the development of solar heating technologies is a high priority for Armenia, from the point of view of diversification of energy systems, finding solutions to environmental issues as well as to the issues of socio-economic development and regional energy security.

The article includes a presentation of the solar radiation resources present on the territory of Armenia. Comparisons have been made to the resources of other countries. The analyses show that

Armenia is rich in natural solar radiation resources, the usage of which has strategic significance for the country.

The annual solar radiation value for Armenia is 1700 kWh/m^2, while for Germany it is 950 kWh/m^2. There are, on average, 1700 sunny hours a year in Armenia, compared to 1000 in Germany. At the same time, Germany is considered the European leader in the usage of solar energy and in 2010, it produced 9,676,800 kW of solar energy, which constituted 10.9%[1] of the energy consumed in the country.

The research also includes a discussion on the solar energy technologies currently available in the international and local markets and it is shown that **Solar Vacuum Water Heaters** (SVWH) are the optimal option for water heating and heating in general in Armenia. The development of solar water heating technology in Armenia, particularly the organization of SVWH manufacturing, would create a new buzz in the regional energy markets and would increase the level of energy security and independence in Armenia and the region, at the same time providing for significant energy savings and the reduction of carbon dioxide emission, a leading cause of global warming. Even if solar energy is applied only for water heating in Armenia, it could reduce the overall cost of water heating in the country by 50-70%.

The article has also conducted an analysis of the consumer potential in Armenia – consumer types were identified based on financial capabilities, utilized systems, the volume of water heating needed and so on. Among others, the usage of solar energy in water heating systems was discussed both for those consumers who currently use gas heaters and for those who do not. The analysis shows that the usage of solar water heaters is more efficient than other systems, particularly compared to gas heaters.

In the early stages of the development of the sector, a series of steps are recommended for beneficiaries in the state, private and community sectors.

The recommendations below are just one part of the actions that need to be taken in this sector. First of all, it is necessary to develop the awareness among consumers about the culture of using

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1 http://www.estif.org/fileadmin/estif/content/market_data/downloads/2010%20European%20Solar%20Thermal%20Markets.pdf

alternative energy resources and, through specific steps, to demonstrate the efficiency of the systems being presented.

Only when this culture takes shape will it be possible to develop the sector from the point of view of creating the production, involving the scientific potential in the research process and making alternative energy use a part of Armenia's energy strategy. The recommendations below list potential actions in different areas.

Spreading information

- Implement small projects demonstrating the domestic and industrial usage of solar energy.
- Prepare and disseminate informational material presenting the advantages of alternative energy in simple language for different layers of society.
- Display to the general public the potential of solar energy, especially in winter time, using mass media as well as through various demonstrations at the expos regularly being organized in Armenia.
- Set up a website which demonstrates the advantages of using various solar energy systems through simple virtual means. Through a few simple steps, visitors to the website should be able to calculate - based on the needs of their household or organization - the costs of a solar heating system, the savings accumulated over a number of years and the point when the cost of the system is covered by the savings.

Educational activities

- Organize presentations and discussions on the means and mechanisms of usage of alternative energy for beneficiaries from state bodies, businesses and community organizations.
- Organize seminars on alternative energy technologies, available systems and other related important issues, for experts in the energy sector.

Business and economy

- Develop preliminary plans for the production of SVWH and Solar Flat Plate Water Heaters (SFPWH), present them to the wider community of businessmen and together try to get subsidies from the government in order to justify the investment.

- Because independent businessmen are the most probable target audience for the development of the sector, the financial and economic analysis conducted as part of the project must be made accessible to them, in order to demonstrate the obvious benefit of solar heating systems.
- After the systems gain popularity, it is recommended to discuss the production projects for SVWH and SFPWH.

Social programs, agriculture

- It is necessary to introduce the technology of preparing heaters from domestic waste material in those communities which use greenhouses. This will promote a sense of excitement about the possibilities of using solar energy in these communities.
- Initiate and implement a pilot social program for the installation and use of solar heating and water heating systems in socially vulnerable rural communities.

EPF's Europe Program exists since January 2009. Its goal is contribution to productive implementation of the Eastern Partnership in Armenia. EPF disseminates information about the European Union and EU-Armenia relations, develops mechanisms for productive reform in the system of higher education, etc.

In May, 2011 EPF invited leading experts to conduct 5 researches on various aspects of the Eastern Partnership implementation in Armenia. The present summary introduces major outcomes of one of the papers.

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Authorship and Disclaimer

This analysis has been conducted by a lead expert on alternative energy resources and water heating systems, Armen Gharibyan, at the request of the Eurasia Partnership Foundation (EPF) as part of its Europe program, with the support of the Swedish International Development Agency (SIDA). The conclusions are those of the author and do not necessarily reflect the views of EPF and SIDA.