

A stylized map of Armenia composed of a grid of grey dots, with several dots highlighted in red to indicate specific locations or data points.

Resource Efficiency Gains and Green Growth Perspectives in Armenia

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- Armenia's energy efficiency in relation to its GDP increased in recent years. This is of particular importance as Armenia used to be an economy based solely on industrial production for many years. Today, export and exploitation of the scarce natural resources based on cheap labour dominate the country's economy. Energy saving and energy generation from renewable energy sources are rare.
- Political support for green growth and progressive energy politics is relatively low. The main political factors hindering such development are considered the reliance on nuclear energy of the political elite and the persistence of regional conflicts, most importantly Nagorno Karabakh. There have been some initiatives launched, mainly shaped by international or European standards. Public debate emphasizes the risks rather than the benefits of green technology.
- Currently, Armenia has no special programme for developing green technologies or creating green jobs. The potential for green jobs cannot be easily estimated as there is no reliable data. The Industry and housing sector provides the main potential for energy saving. Currently, renewables do not play a major role, but the most promising ones are considered hydro power and waste. As Armenia's innovation rate increased in recent years, it does have the potential to create green technologies.



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Background

Environmental technologies, such as renewable energies, recycling technologies, technologies for sustainable transport and so on are not yet being implemented in Armenia. Both the production and use of these technologies lag behind those seen in more advanced countries. This chapter presents a number of causes of this situation. In particular, a number of political factors, both internal and external, hinder full-scale development. The most important among them are the plans of the political elite to rely on nuclear energy and the existence of regional political problems, first of all, the Nagorno Karabakh conflict. However, Armenia has significant potential for developing green technologies and significant work is being done for that purpose.

Current Situation

Armenia is a small post-Soviet country located in the South Caucasus. Its GDP is estimated to be around 10 billion US dollars and the share of industry, including that of energy production, was 14 per cent in 2010. According to the World Bank,¹ in 2010, the country's GDP was equivalent to 9,264 million US dollars. It must be mentioned that in 2009, Armenia's GDP experienced negative growth due to the global economic crisis and in 2010 growth was low for this and other reasons.

This means that Armenia's contribution to greenhouse gas emissions is very low.² Suffice to say that in 2010, Armenia imported from Russia 1.7 billion cubic meters of natural gas, whereas the European Union each year imports more than 60 billion cubic meters of gas from Russia alone. Also, in reviews on the emission of greenhouse gases (for example, that of the OECD) Armenia is not indicated at all. Not surprisingly, Armenia has not been very active at UN events dedicated to this problem. However, Armenia pays great attention to the efforts of the international community aimed at restricting the influence of economic activity on the environment. In particular, at the

UN meeting in Durban, South Africa, which was dedicated to working out a new treaty to replace the Kyoto Protocol, Armenia was represented by a delegation led by a Deputy Minister of Environment, although the negligible contribution of the country to that problem and its low importance in the UN did not impose such a precondition. Armenia has been active in implementing other UN environmental Conventions, too.

The country's current economic strategy can be described as an export-oriented one based on cheap labour and on the exploitation of its natural resources and partly on the service industry. In particular, exports of copper and molybdenum are major sources of revenue. However, Armenia used to be an industrialised country under Soviet rule and recent governments have made efforts to restore this. Recently, the government adopted a programme to stimulate manufacturing industry. It is officially named the Industrial Policy of Armenia Aimed at Stimulating Exports³ and stimulation measures for 11 sectors are expected. Its results are expected to be seen as early as in 2015 and foreign investors (any investors are invited) are supposed to play a major role in this. In the Document produced by the Ministry of Economy, the development of a green economy and, in particular, the creation of green jobs are not directly indicated. However, biotechnology development is indicated as one of its primary targets as it is included in the first group of sectors to be boosted by the state. The development of the Yerevan Engineering University is also included among the targets.

At present, most of industrial production is based on the extraction and treatment of the country's scarce natural resources. The country's industry also consumes significant amounts of energy,⁴ which is to a significant extent based on carbon.⁵

1. See <http://data.worldbank.org/country/armenia?display=map>

2. The International Energy Agency presents no data on greenhouse gas emissions by Armenia. The World Bank group (<http://data.worldbank.org/country/armenia>) provides data for CO₂ emissions in Europe (excluding the EU) and Central Asia for 2008. According to that source, the above countries emitted 7.7 tonnes of CO₂ per capita, whereas Armenia emitted 1.8 tonnes per capita. Note that the emissions of OECD countries were 10.5 tonnes per capita in the same year.

3. See <http://www.mineconomy.am/am/81/> (available in Armenian only).

4. According to World Bank estimates (see <http://data.worldbank.org/topic/energy-and-minin>) in 2009, Armenia consumed 1.803 kg of oil equivalent per capita. The share of alternative and nuclear energy for 2006–2010 was estimated at 31.7 per cent. In 2008, (http://www.iea.org/stats/bal-ancetable.asp?COUNTRY_CODE=AM, the latest data available) Armenia consumed 2997 kt of oil equivalent of fuel. Of this quantity, electricity production (including combined heat production plants) used 800 kt, other industries used 840 kt, transport used 307 kt and other users – mainly households – used 660 kt. The distribution of natural gas between the latter four sectors is: 443/840/99/418. Thus, industry consumes the largest share of imported gas, larger than the share of electricity production.

5. The use of fossil fuels was estimated in Armenia at 68.4 per cent in 2009 (<http://data.worldbank.org/indicator/EG.USE.COMM.FO.ZS/countries/1W?display=default>). No newer data are available in international or national sources.



The Problem of Green Technologies and Green Jobs in Armenia

»Green technologies« and »green growth« were defined by the OECD in 2011 as follows:⁶ »Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. To do this it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities. A return to »business as usual« would be unwise and ultimately unsustainable, involving risks that could impose human costs and constraints on economic growth and development.«

For its part, the United Nations Environmental Programme gave the following definition of »green jobs«⁷ in 2008: »green jobs [are] positions in agriculture, manufacturing, construction, installation, and maintenance, as well as scientific and technical, administrative, and service-related activities, that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect and restore ecosystems and biodiversity; reduce energy, materials, and water consumption through high-efficiency and avoidance strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution.

Both definitions leave enough room to conclude that not only genuine green technologies are worth considering but also technologies (and jobs) that are »more green« than previous ones. A number of such examples are presented here. The most widely known and most disputed question concerns the construction of a new nuclear power plant in Armenia. Nuclear power is considered a more »green« technology for energy production than the »traditional« methods of burning carbon fuels.

Other aspects of this problem will be considered below.

Current Programmes Aimed at Promoting Green Technologies

Currently, Armenia has no special programme for developing green technologies or creating green jobs. However, many programmes are under way that can be considered conducive to such jobs and thus to developing green technologies. Most of these programmes are related to electrical energy production or energy saving, mainly under the leadership of the Ministry of Energy and Natural Resources. These programmes are being implemented principally in the industry sector, which has the greatest potential for energy saving and the creation of green jobs, especially if it develops as rapidly as projected. The housing sector also has strong potential for economies since it is one of the largest consumers of fuel.

Energy Saving

The main targets laid down in the Document adopted in 2007 – the National Programme of Energy Saving and Renewable Energy⁸ – are as follows:

- reduction of energy consumption in the drinking water system;
- reduction of energy consumption through the introduction of energy-efficient lighting;
- reduction of relative energy consumption in the mining industry;
- reduction of relative energy consumption in the chemical industry;
- reduction of energy consumption in the food industry by introducing modern technologies.

The Programme has several other goals (evidently, the housing sector has significant potential for energy economies). However, four years after these targets were adopted one can see that the Programme needs modification. This need is dictated first of all by the global economic crisis of 2008–2009. One example of the influence of the crisis on the Armenian economy is par-

6. See www.oecd.org/dataoecd/37/34/48224539.pdf, p. 9.

7. See www.unep.org/PDF/UNEPGreenjobs_report08.pdf, p. 35.

8. See: <http://www.minenergy.am/en/en/2010-06-13-18-18-00>

ticularly worth mentioning. In an unprecedented move, in 2009 the three largest mining companies in Armenia received six-month loans from the government (29 million US dollars overall) which enabled them to introduce modern technologies to allow better extraction of copper and molybdenum, thus minimising the effects on the environment. This could be considered another example of the creation of green jobs.

In all such initiatives, the government of Armenia gives priority to private investment.⁹

Such investments were numerous in 2011, but, as already mentioned, their results will only be discernible in the fullness of time.

The saving potential of the transport sector is also great but it does not depend largely on initiatives started in Armenia, since Armenia does not produce vehicles. The targets laid down in the Document become a reality when they are commercially viable – in other words, when a company involved in any of these programmes can make a profit under current tariffs.

One achievement deserves particular attention. This is the launching in April 2010 of the new block of the Yerevan thermal power plant (Yerevan TPP) in which the use of natural gas per unit of electricity is 2–2.5 times lower than in other stations active in the country. A similar achievement was expected with the launching of the fifth block of Hrazdan TPP, another major producer of electricity, scheduled for 2011. However, technical problems arose and initially (at least for several months of 2012) this block will be operated without the gas turbine that is responsible for the major saving. For the time being (16 January 2012) there is no official information on the launch time of the fifth block. However, it is believed that equipment was being tested for several months starting in late 2011.

9. In 2000–2009, after the mass privatisation of the 1990s was over, the governments of Armenia made very few investments, giving priority to private investments. This situation changed in 2009, when the government resumed investment in an effort to activate the economy which had been hit by the global economic crisis. In this period, a loan of 500 million dollars was obtained from Russia and half of it was used for construction in the zone of the 1988 earthquake. In this period, loans for large mining enterprises were also provided (see above). Details are presented in the Summary Report on the Implementation of the Government's Anti-crisis Action Plan at <http://www.gov.am/en/Anticrisis/>. The abovementioned programme – the Industrial Policy of Armenia Aimed at Stimulating Exports – can also be regarded in this light as it provides a number of concessions to private investors (one result of which is a reduction in government revenues).

Other forms of energy saving are relatively rare in Armenia. For example, since 2000 many companies have been using solar energy in various ways. In recent years, a number of buildings in Armenia have been equipped with solar photovoltaic modules (for example, the new buildings of the checkpoints on the Armenian-Georgian border will have such equipment).

In all cases, Armenia uses imported solar energy devices, although it has the potential to produce them (at least, many components).

Summarising the relevant data: according to the World Bank, in 2006 Armenia's GDP was 5.6 US dollars per kg of oil equivalent, increasing to 5.7 dollars in 2009 (both numbers PPP of 2005).¹⁰ In other words, during these years, the energy efficiency of Armenian GDP increased by 17.8 per cent. Data are not available for other years and we cannot say whether this tendency is continuing.

Electricity Production

Hydro Power

As for the efforts of creating hydro power stations, which use the only type of energy source in which Armenia is rich and which is most friendly to the environment, many hydro power stations have been constructed and there are plans to construct many more. The hydro power stations of the Sevan-Hrazdan Cascade (with a cumulative installed capacity of 550 MWt) and of the Vorotan Cascade (capacity 404 MWt) are important elements of Armenia's energy industry.

Both large and small (under 10 MWt) hydro power stations are being designed and constructed. At least two large hydro power stations, Loriberd (about 66 MWt on the Dzoraget River) and Shnogh (about 75 MWt on the Debed River), are to be built in Lori province. In addition, work is under way to construct a hydro power station of 130 MWt jointly with Iran on the border river of Araks near Meghri.

Small hydro power stations are being built intensively as they are believed to be a promising sector for energy production. Such stations can be constructed in

10. See: <http://data.worldbank.org/indicator/EG.GDP.PUSE.KO.PP.KD>

the mountainous country where there are many small rivers. According to the Ministry of Energy and Natural Resources,¹¹ as of 1 October 2011 electricity was being generated by 113 small HPPs, with a total installed capacity of about 150.76 MW and an electricity supply of around 490.7 million kw/h. The same source reports that as of 1 October 2011, licenses for construction had been issued to another 85 small hydro power stations, with a total installed capacity of about 162.86 MW and an electricity supply of around 600.4 million kw/h.

Small hydro power stations alone are believed to provide 10 per cent or more of the electricity currently needed in Armenia, although they comprise a smaller share of the installed capacity of electricity-generating plants. Hence, the country tends to use »green technology« instead of burning fuel.

Geothermal Energy

This is seen as the second most promising area after hydro energy. At least, a number of commercial companies have shown an interest in it.

According to a report of the Ministry of Energy and Natural Resources,¹² studies are currently under way in different locations (mainly in Sunik province) .

2.3 Green Technologies in Other Sectors

Projects concerning renewable energy are the best known among the green technologies used in Armenia (see above). However, many such projects are currently in abeyance or continue only at the research level since they are currently not commercially viable. As already indicated, other areas in which the implementation of green technologies might be expected are not active in this field. This is mainly due to political reasons, which will be discussed below. Only recently has the Minister of Environmental Protection begun to speak of the need to develop green technologies.

Other factors which make developments in this direction necessary are Armenia's strong energy dependence on other countries (such as Iran and Russia) and its current inability to develop a number of industries, in particular, its own chemical industry, rendering it dependent on the decisions of private investors. In particular, the Ministry of Energy and Natural Resources recently reported that it is seeking an experienced operator to run Nairit, a big chemical plant in Yerevan. It remains to be seen whether this operator will use green technologies, or at least greener than those used so far.

Tourism and services

Information technology and tourism have been declared priorities, and both sectors can create large numbers of green jobs. Currently, there is a large-scale dispute concerning whether tourism is compatible with the mining industry, which traditionally has been strong in Armenia. This discussion is propelled by the fact that Svarants, a large reserve of iron in the southern province of Sunik, is located near the Tatev Monastery, a complex of buildings dating back as far as the ninth century, which is in the process of developing into a major tourist centre (in 2010, the longest passenger rope-way in the world was constructed there and the project of developing the southern part of Armenia is being supported by many Armenian business people living abroad). The service sector in general is very promising in terms of creating green jobs, especially in tourism and information technology, which the government has strongly promoted in recent years. The same is true of other services (such as education), largely supported by Armenians living abroad through the Armenian National Competitiveness Foundation.¹³ However, this only commenced in 2010 and thus it is too early to evaluate.

A large number of green jobs can be created in almost every section of industry and agriculture (these conclusions are based on numerous statements of by government authorities and specialists in recent years) .

11. See: <http://www.minenergy.am/en/en/2010-06-12-19-38-02/2010-06-12-20-42-45/2010-07-11-18-43-45/87-2010-06-12-21-22-11>

12. See: <http://www.minenergy.am/en/en/investment-projects/eothermal-energy/126-2010-09-29-21-43-35>. Also the minister has made a number of statements.

13. See: <http://www.cf.am/?laid=2>



Mining Industry

Disputes similar to the one mentioned above have arisen in relation to three projects, reflecting the difficulties faced by countries such as Armenia with regard to development. The first concerns the Teghut Mine in Lori Province, which is very rich in copper and molybdenum (other metals can also be extracted). The Armenian Copper Programme (ACP) company is seeking a licence and a large loan for exploitation over the course of 50 or 60 years. However, environmentalists claim that this would annihilate 300 hectares of forest and result in toxic emissions. In response, ACP says that for every hectare of forest cut down it will plant two hectares. As for the pollution, ACP claims that it will use green technology to reduce toxic waste to a minimum. The dispute is expected to be resolved in the near future.

Two similar potential disputes exist in Sunik Province. One concerns the possibility of discovering uranium there. The other concerns about the land surrounding the small village of Kajaran near the Zangezur copper and molybdenum factory (one of three recently developed – see above). The factory is believed to have its eye on this land, a prospect that the villagers are resisting. In both cases, environmentalists have staged large-scale protests. The government has responded that no uranium has been discovered in Armenia so far, but even if it was it would be extracted using the greenest technologies available. As for the Kajaran lands, while the factory has officially declared that it is not interested in them they contain up to 8 per cent of the world's molybdenum reserves and for this reason the government has forbidden their sale.

A number of smaller extraction disputes have been resolved or are close to resolution.¹⁴

Other Sectors

In the emerging recycling industry, too, there is considerable potential for green technology. However in this and many other sectors the government is fairly passive, leaving private companies to act at their own risk. For example, there is no legislation on rubbish collection, although there are at least two companies involved in

collecting rubbish in several cities (Vanadzor, Gyumry and to some extent Yerevan) and processing used (secondary) plastics (mainly polyethylene) instead of burning it. The United Nations and the United States support such operations. For example, they gave 500,000 dollars to the company Ecengineering [?] under an agreement signed on 17 March 2011.

There is at least one company, Grand Candy, which processes used paper into toilet paper and serviettes.

National Research Programmes that May Lead to the Creation of Green Jobs

As already mentioned, in modern Armenia, the majority if not all green jobs are being created in renewable energy production. This is supported by the current government. In particular, in 2005 it created the Armenian Renewable Resources and Energy Efficiency Fund,¹⁵ which has implemented many projects in cooperation with international financial organisations. In particular, this fund supports private companies working in this area. Besides that, many private companies are doing research and there are a number of similar funds created by Armenians abroad for projects in Armenia.

Hydro Power

The construction of a network of hydro power stations with a view to diminishing Armenia's dependence on imported energy has already been presented in some detail. Research into the feasibility of specific projects has been carried out by private companies. Armenia also plans to design and produce equipment for small hydro power plants (500 kW and lower¹⁶).

Wind Energy

Current estimates of the wind energy resources of this mountainous country are as follows. According to a re-

14. There are many websites that detail such disputes. See for example <http://www.ecolor.org/>

15. See: <http://r2e2.am/en/about-us/>

16. See: http://www.renewableenergyarmenia.am/index.php?option=com_content&task=view&id=17&Itemid=122



port by the Ministry of Energy Natural Resources,¹⁷ the quantity of economically exploitable wind energy is about 450 MW. The main prospective sites are located in Gegharqunik Province, Lori Province, Gegharqunik Province and in several other places.

The first wind power plant in Armenia and indeed in the Caucasus, with a total capacity of 2.6 MW, was put into operation at Pushkin Pass in Lori Province in December 2005. The construction of a wind power plant is envisaged with a total capacity of up to 20 MW. The Ministry has also proposed an investment project for other areas.

Other Forms of Renewable Energy Source

According to expert estimates, Armenia has potential to develop other forms of renewable energy, especially biomass, hydrogen and solar energy. Armenia has been mentioned as a country with significant solar energy potential. The average annual amount of solar energy flow per square meter of horizontal surface is about 1720 kWh (the European average is 1000 kWh). There has also been significant research in Armenia, especially with regard to solar thermal energy.

There are many groups and small companies carrying out research work in various areas. The principal direction of such studies is renewable energy (the National Fund for Renewable Energy and Energy Saving is very influential here). The results of such studies are sometimes demonstrated at exhibitions such as the one organised in Yerevan in March 2011.¹⁸ The support of organisations of the Armenian diaspora is an additional asset. But these are disparate actions and thus results are difficult to achieve. In rare cases when international organisations are involved the results become available to a larger public.

The lack of government support (see also above) is currently the main obstacle to the development of a low-carbon economy. A paradoxical situation thus char-

acterises Armenia. The country has a good record for research work and seems to be a good site for innovative research. On the other hand, it spends too little on research and education.

The government has no possibility to materially support most of the initiatives listed above. Meanwhile, private business invests in them only when they are profitable. The fact is that many are not profitable at present since the government can obtain traditional forms of energy relatively cheaply.

Politics and Society

Other government entities, such as the Ministry of Nature Protection, the Ministry of the Economy and the Ministry of Agriculture also have environment-friendly projects but they are much less advanced than those of the Ministry of Energy and Natural Resources. For example, among the lines of research financed by the state (State Scientific Committee of the Ministry of Science and Education)¹⁹ only one related to nature protection was financed in 2011. The main reason is that Armenia has so far obtained »traditional« carbon-based fuel relatively easily as it has good relations with two large countries producing oil and gas, namely Russia and Iran. The need to develop alternative energy sources thus remains a novelty in Armenia. Even the literature on this topic (for example, the OECD's report available at www.oecd.org/dataoecd/37/34/48224539.pdf is not available in Armenian).

Public Movements

There are many public debates in Armenia on environmental questions, typically involving the emerging civil society. But these debates mostly do not support the introduction of modern technologies, rather emphasising the potential dangers of particular projects. For example, as already mentioned, popular movements – in which mainly young people participate – have been started to protest against the opening of the copper mine in Teghut (Lori Province), the iron mine in Hrazdan in Kotayk Province (which is similar to the abovementioned dispute in Svarants: both are expected to be bought by the Chi-

17. See: <http://www.minenergy.am/en/en/investment-projects/wind-energy/124-2010-09-29-21-19-24>.

18. Exhibitions on renewable energy or energy saving are a new phenomenon in Armenia. At least two such exhibitions were organised in 2011, in March and in October. At the event organised on 24 March, along with equipment produced in other countries, projects for energy saving and energy production from alternative sources were presented by nearly a dozen small Armenian companies.

19. See: http://scs.am/index.php?page=2010-2&hl=am_AM



nese company Fortune Oil) and the construction of a small hydro power station which might change the water flow of the Trchkan Leap in Lori Province. But there are no popular movements advocating more innovative action, such as collecting waste plastic or using renewable energy sources.

The Armenian Nuclear Power Station

An additional difficulty arises from the problem that Armenia – all its governments and all three Presidents so far – has actively sought to preserve its nuclear potential, extending the lifetime of its nuclear power plant, the only one in the region (currently only one block of the Soviet-era station is operative, built in 1980. Initially, this nuclear power plant (in Metsamor, 38 kilometres west of Yerevan) was scheduled to close in 2004 but modifications performed with the help of specialists from Russia and the EU, and under the supervision of the IAEA, made it possible to extend its lifetime to 2016, when a new block is supposed to be ready to replace the old one (the new nuclear power plant is expected to be built in the same place as the old one). In 2010, a deal was signed with Russia according to which Russia will construct the so-called »nuclear island« of the future plant. In 2011, this process, which had been supported by President Serzh Sargsyan, was discontinued, mainly due to the aftermath of the earthquake in Japan on 11 March 2011 and the disaster at the Fukushima nuclear power plant.

Meanwhile, Serzh Sargsyan has been seeking investors worldwide: according to official information, this issue was discussed during meetings with the presidents of France and Italy. Obviously, besides the political reasons, the fact is that nuclear power is »greener« than the production of electricity by the burning of carbon-based fuel, which at present is the main source of electricity in Armenia. These factors, together with, for example, the activities of the Presidential Atomic Energy Security Council created in 1996 and involving the participation of a number of European scientists,²⁰ signal to Armenian society that the future of the Armenian energy system is linked to nuclear power and is safe. In these conditions, no wonder the state has no political strategy for developing renewable energy and other sources of green jobs.

20. The Council is currently led by Professor Adolf Birkhofer, a scientist from Germany who has declared on a number of occasions that Armenian nuclear power is safe.

The Role of the State and Political Parties

The state recognizes the important role of the state in every sphere of life, including green growth (there are many indications of this, although there have been no public statements, for political reasons). However, the state is not active in its efforts to implement modern technologies (both relative to business and relative to society). As is typical of a newly created post-Soviet nation, the priorities of the authorities are the creation of a modern political system. This is even more important for Armenia which has no fuel resources and gets too little aid from foreign countries. Green technologies are still fairly expensive. In addition, settling relations with two of its four neighbours, namely Azerbaijan and its supporter Turkey, is a major priority for the Armenian ruling elite. In particular, the unresolved Armenian-Azeri conflict over Nagorno Karabakh attracts much attention. The fact that the small Armenia is obliged to maintain one of the strongest armies in the region (numbering at least 70,000, which is a great burden on a new state with a population of 3 million or so) is a good indication of its current priorities.

The state has initiated many regulations (in particular, in the energy sector) that are necessary for the introduction of modern technologies. However, it is more important that Armenia develop a business climate that is more conducive to growth than at present. Major changes are needed in tax and customs regulations, as well as in the behaviour of both the authorities and the general population. This is a very complex process and it needs time. Hopefully, the reforms initiated by the current government led by Tigran Sargsyan will help in this process.

As already mentioned, the creation of green jobs and the development of green technologies is not among the government's declared priorities. The nationalist Republican Party has governed Armenia since 1998, but its views on this issue are shared by most political parties in Armenia (there are now over 60 parties in the country).

There is no Green Party in Armenia, however, and the existing Green Union is still using approaches inherited from the Soviet era. It expends most of its efforts supporting the public movements mentioned above.



The Role of Foreign Actors

As the importance of developing its own green technologies is still not fully appreciated in Armenia, the introduction of international or European standards – often on a compulsory basis – plays a pivotal role in efforts to implant modern green technologies in Armenia. Almost every state programme aimed implementing green technologies – including most of the programmes mentioned in this work – was created and implemented as a result of support from an international organisation or a Western government. In all these cases, international standards with regard to green technologies were introduced and they have become the basis for implementing such approaches in Armenia. In the near future, an acceleration of this process is expected, especially because Armenia is an active member of the EU Eastern Partnership initiative.

An increase in the number of such initiatives was observed in 2011. In particular, the German GIZ has organised several events in Armenia. The Green Economy exhibition of 6 December 2011 is only one example.

Conclusions

We conclude with a number of key points.

1. In modern Armenia, green technologies are deployed mainly in the energy sector. Many modern technologies are also used in mining and tourism.
2. The technologies used at present are mainly imported. However, Armenia has the potential to create its own green technologies, too, and there are many companies engaged in technological development activities.
3. State support for technological research is very limited. As a result, the quantity and quality of green jobs is currently unknown.
4. The principal reasons for the stance of Armenia's political elite and thus of society as a whole include regional political events, including the conflict over Nagorno Karabakh.
5. The support of entities from the developed countries, including from Europe, is seen as an important factor in developing and applying green technologies.



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