Green Energy Targets: One Step Forward, Two Steps Back

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On February 13, an interesting event took place in Azerbaijan's energy sector: government officials gathered for a groundbreaking ceremony of a 1.280 MW thermal power plant in the city of Mingachevir, the largest ever built since Azerbaijan`s independence, according to official data. The planned capacity of the plant is equal to 17% of the country's current electric power generation capacity. But what makes this event interesting is not the gigantism of the plant. No, particularly eye-catching is that the government is embarking on a plan to construct the largest conventional fossil-fuel power plant at a time when it has set extremely ambitious goals and initiatives related to green energy targets. So, what does this power plant mean for those targets?

A 30 percent target and the current state of energy infrastructure

One of the five directions in *Azerbaijan 2030: National Priorities for Socio-Economic Development*, approved by the Presidential Order dated 2 February 2021, is the identification and prioritization of areas with renewable energy potential. The strategic target set in the "Strategy for Socio-Economic Development for 2022-2026," prepared within these priorities, is to bring the share of renewable energy sources in electricity production to 24% by 2026 and to 30% by 2030. In turn, there are also significant initiatives planned to achieve this target and already prepared to implement some of them, including:

1. The construction of 2 plants (wind and solar) with a capacity of 470 MW with *ACWA Power* of the Kingdom of Saudi Arabia and UAE-based *Masdar* in Khizi and Absheron districts;

2. The construction of a 240 MW solar power plant by British oil giant BP Jabryil district;
3. The construction of 400 MW wind power plants, the installation of 150 MW roof solar power systems and the restoration of eighteen small 83 MW hydro power plants in Kalbajar and Lachin districts.

The above-mentioned initiatives are expected to add about 1.300 MW of additional capacity to the country's power infrastructure, which is close to the capacity of the abovementioned 1.280 MW thermal power plant, the construction of which has already begun in the city of Mingachevir. However, it should be taken into account that at present, the installed capacity utilization factor of the thermal power plants commissioned by Azerbaijan in recent years is almost 3-4 times higher than renewable energy sources. This means that the contribution to production of the thermal power plant, which will run on traditional fuel, will be just as high. That is, if the government wants to achieve green energy targets by 2030, the renewable energy capacity must be several times higher than that of conventional plants. For example, in recent years, renewable energy sources account for an average of 75-80% of the capacity worldwide. Globally, 300.000 MW of electricity was generated in 2021, of which 50.000 MW alone came from plants running on traditional fuels, according to the International Renewable Energy Agency (IRENA).

It is true that Azerbaijan's Ministry of Energy signed a series of agreements with Masdar, one of the world's leading renewable energy companies, to develop clean and renewable energy projects in the country with a combined capacity of 4.000 megawatts (including the development of onshore wind projects with a capacity of 1.000 MW, 1.000 MW of solar photovoltaics, and integrated offshore wind and green hydrogen projects with a capacity of 2.000 MW). However, it is unrealistic that these projects will have been implemented by 2030.

As for the current structure of energy capacity, according to official statistics, the installed capacity of power plants in Azerbaijan amounts to 7.965,2 MW, of which 81,5% (6.649,4 MW) comes from thermal power plants, and 18,5% (1.315,1 MW) from alternative energy sources (including 14,5% or 1.157,2 MW, 4% or 158,6 MW from wind, solar and waste-water plants). 91% of the generated electricity is provided by thermal power plants and 9% by alternative sources. In addition, the wind and solar power plants account for about 0,4% of total production capacity.

The installed capacity utilization rate also varies greatly depending on the plant. For example, 43% at thermal power plants, 14% at hydropower plants, 8% at wind farms, 14% at solar farms, and about 50% at solid waste treatment plants.

The government's expectations from the expansion of traditional energy sources and the realities of the global energy system

In preparing this article, we individually discussed the following questions with two experts specializing in energy issues: What is the government's target for the accelerated expansion of the country's energy system capacity at the expense of thermal power plants? Is the country's domestic consumption expected to skyrocket in the foreseeable future, and thus will renewables be unable to meet consumption? Or is the government more focused on becoming an electricity exporter, given the growing demand of European countries amid the Russian invasion of Ukraine?

The experts claim that even with domestic consumption growth in the range of 20%to 25%, there is potential for expanding production in the coming years by further utilizing extant power plant capacity. They note that some TPPs are operating below the installed capacity. In short, it was an inevitable necessity to construct the North-1 plant and other grids under restrictions for initiatives to obtain energy from renewable

energy sources, and in the face of high domestic demand between 2001 and 2009. However, now there is no such need, and all resources should be directed to renewable energy projects. If the goal is to increase export potential, it should also be provided for by green energy.

Those involved in the energy sector consider the desire to expand export potential in the short term to be a more reasonable version, and president Ilham Aliyev's speech at the groundbreaking ceremony for the aforementioned thermal plant also placed considerable emphasis on the state's desire to export energy. According to the energy experts with whom I discussed this subject, if the new 1,280 MW thermal power plant operates under ideal conditions (a maximum 8.000 hours of operation annually), it will bring an additional $8,5-9 billion to the country's energy system. It would require 1,6-1,8 billion cubic meters of natural gas to produce that amount of electricity at optimal norms. From a purely economic point of view, the export of gas in this volume at current prices could bring more revenues than the export of electricity generated by it.

For example, even in the context of exchange prices, which are cheaper than the current world market prices ($400-$450 per 1.000 cubic meters of natural gas), 1,6-1,8 billion cubic meters of gas exports will generate $700-$800 million in revenues. However, last year, Azerbaijan earned 125 million dollars net profit from $1,7 billion kWh worth of electricity exports, with $0,07 per kWh. That is, even if these high prices remain, electricity exports generated by the 1.280 MW thermal power plant will bring a revenue of $600-$650 million dollars. It should be kept in mind that this market is very complex and volatile. First, unlike natural resources, a greater number of countries have alternative energy capacity, thus giving ample opportunities for fierce competition in the market. Consider a country with no natural resources seeking to reduce its energy dependence with the help of alternative energy resources. Germany is a prime example of this.

On the other hand, the rapid development of new technologies reduces the cost of alternative energy in addition to boosting its production volume (share) quickly. Even the world's largest exporters of electricity have a very small share in total export revenues. For example, an analysis of figures included in the United Nations Comtrade database shows that France, one of the largest energy exporters, in 2021 earned $7 billion in revenues out of nearly 70 billion kWh of electricity. Azerbaijan needs to increase its current investment by at least 3,5-4 times to create export potential at this level. But how efficient the export of electricity is only the economic side of the issue. In addition, the energy experts to whom we spoke also draw attention to specific technical limitations directly related to the field itself. For example, one of their main arguments is that power transmission over long distances is not always technically profitable because of high transformation losses. The largest problem here is that Azerbaijan does not have access to international transport infrastructure to transmit its electricity through a wide area synchronous grid operating at a synchronized utility frequency.

Thus, for the time being, Azerbaijan can only reach the world market via the Georgian-Turkish line. These two power transport hubs are connected only by converter substations, an alternative to systems operating at a synchronized utility frequency.

In conclusion, the adoption of spontaneous decisions in the energy sector suggests the absence of a fully justified strategy for the medium and long-term development of the sector. This strategy should clearly define the country's green energy targets by five-year intervals for the next 25 years, as well as projects to be implemented to achieve them and their financial feasibility. In turn, strategic papers should define clear commitments for the government, instead of gathering dust on shelves and being used to divert public attention.