

CAN THE CLEAN DEVELOPMENT MECHANISM PROJECTS ACCELERATE INVESTMENTS TO BUILD NEW HYDRO POWER PLANTS IN GEORGIA?

Introduction

The Georgian energy sector has already been modified substantially over the last ten years. Important reforms and transformations were conducted in order to establish a market-based energy sector, especially its electricity segment.

Currently, several actions have been taken to increase the incentives for private investors to invest in the electricity sector:

- All the newly built HPPs (built since 2008) are deregulated and investors are free to choose the market and the price for selling their output. In addition, HPPs of up to 13 MW have a special right to sell electricity to any retail customers.
- A potential investor is offered a unique ownership advantage BOO (build, operate, and own).¹
- No license is required to export electricity.
- There is no special fee for connecting to a grid of a newly built HPP.

In addition, the system operator in Georgia, ESCO, guarantees purchase of all electricity from the newly built HPPs during the next ten years (three winter months each year), which reduces the risk that a new plant will not use its full capacity.

Finally, the Black Sea Transmission Network (500/400kv) Project, which aims at the rehabilitation and construction of 500kV overhead line Gardabani-Akhaltzikhe-Zestaponi (about 270km) as well as the construction of 400kV line from Akhaltzikhe to the Turkish border (35km), will enhance the transmission system and will increase export opportunities from Georgia to Turkey. It is expected that the line connecting Georgian and Turkish energy systems will be put into operation at the end of 2012.

In spite of these actions, private investments in new HPPs continue to fall short of what would be expected and needed. The current situation arises one fascinating question: “Is Georgia’s hydropower potential only technical or does it have also economic valuation?” In other words, is utilization of Georgia’s whole hydropower potential economically justified at the current situation? To answer this question it is important to observe an investor’s behavior regarding investing money in new Georgian HPPs. As the last years’ experience has revealed, investors and especially regional companies are interested to invest in Georgian HPPs; its indicator is large number of signed Memorandum of Understandings (MOUs)² between investors and the Ministry of Energy and Natural Resources of Georgia (MENR) [7]. This clearly shows that there is interest from the private sector of investing money and there are investors who believe in profitability of new HPPs. However, it is observed that most of investors choose strategy only to sign MOUs and than

¹With a BOO contract, a private company is granted the right to develop, finance, design, build, own, operate, and maintain a project. The private sector partner owns the project outright and retains the operating revenue risk and all of the surplus operating revenue in perpetuity [7].

² Currently 40 Projects are under the MOU, their total capacity is 1872 MW and their estimated generation is 7391 GWh. All these projects are hydro power plants except Paravani wind power plant with 50 MW installed capacity [7].

delay investing money. The behavior of investors dictates that something is wrong with status quo and they are waiting for the “better future”.

Probably, the best explanation of this phenomenon is that Georgia still faces high political and economic risks, and investors remain concerned that the country is not a secure place to do business. According to *Euromoney Magazine*, in the list of countries’ risk rankings Georgia is on the 76th position among 100 countries [9].³

If this is the case, the main challenge now is to convince foreign businessmen that it is worth investing in the Georgian energy sector. This can be done either by reducing the investors’ perceived risk or by increasing the investors’ expected returns by including enough to compensate them from the excess risk of investing in the Georgian energy sector. In other words, an investor should get a risk premium which is equal to the return in excess of the risk-free rate of return an investment is expected to yield. An investor should be compensated for tolerating the extra risk.

Applicability of CDM Projects in Georgia

Help in this direction could come from the Clean Development Mechanism (CDM) project. Georgia ratified the United Nations framework Convention on Climate Change (UNFCCC) in 1994 and joined the Kyoto Protocol on June 16, 1999. Georgia, as a Non-annex I party, can participate in CDM project since it satisfies all three requirements:

- Georgia voluntarily participates in CDM;
- Georgia has nominated CDM “Designated National Authority” (DNA);
- Georgia is a party to the Kyoto Protocol.

CDM is a scheme for greenhouse gas (GHG) reduction through cooperation between developed countries (the parties included in Annex I) and developing countries (the non-Annex I Parties), which do not have any obligations to reduce GHG emissions. CDM will help the non-Annex I Parties to achieve sustainable development and help Annex I Parties to obtain their quantified emission constraints and reduction commitments under the Kyoto Protocol [3].

The most common greenhouse gas produced by anthropogenic activities is a carbon dioxide (CO_2). Fuel consumption for power generation constitutes the main source of CO_2 emissions. Renewable energy (hydro, solar, wind, etc.) utilization for power generation is one of the most efficient ways to reduce CO_2 emissions.

To calculate Certified Emission Reductions (CERs) achieved by the CDM project, it is necessary to determine the baseline emissions⁴. Building new HPPs in Georgia could be awarded with CERs, since “clean electricity” generated by new HPPs could substitute electricity generated from thermal power plants which are source of CO_2 emissions and, additionally, substitute the country’s import (Georgia imports electricity from the neighboring countries where electricity is mostly generated from burning fossil fuel). To conclude, Georgia has the necessary legal base and potential to participate in CDM projects which could become an accelerating force for the necessary investments in the electricity market.

³ Combined Euromoney Country Risk (ECR) score combines six categories; ECR score for Georgia in March 2011 was 47.77 out of 100. By categories - political risk 44/100 (30% weighting), economic performance 55.34/100 (30% weighting), structural assessment 60.56/100 (10% weighting) debt indicators 8.56/10 (10% weighting), credit ratings 1.88/10 (10% weighting) and access to bank capital markets 1.50/10 (10% weighting).

⁴ The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. Consequently generated by the CDM project emission reduction is difference between baseline and project emissions.

Can CDM projects influence an investor's decision making process?

One of the most desired methods to increase profits of new HPPs is additional revenues raised from the implementation of Clean Development Mechanism Project. This way of mobilizing financial resources is most acceptable from the country's perspective, because it fosters to utilize hydro resources that would substitute electricity produced by thermal power plants. Reduction of TPP production has double benefit for Georgia: it reduces harmful greenhouse gas emissions and dependency on imported natural gas. Thus, implementing CDM projects through building new HPPs has financial benefits for an investor and significant positive externalities for the country.

However, in the present paper estimation of ecological benefits is beyond the scope of my research. Instead, focus is on the financial benefits from the implementation of CDM projects for potential investors, since the aim is to determine how additional financial resources from CDM projects influence an investor's decision making process, whether invest money or not.

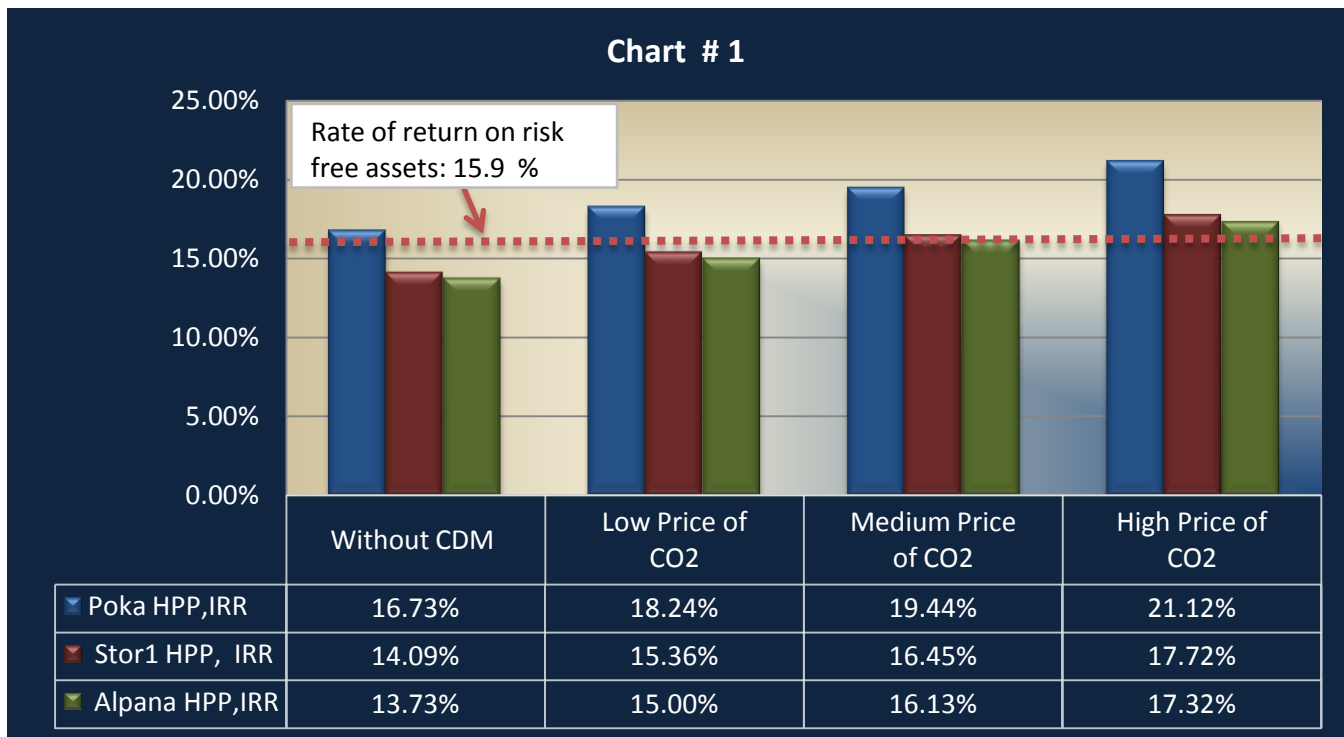
For the analysis I have used Internal Rate of Return (IRR) approach. Calculating IRRs for three proposed HPPs for four different scenarios (without CDM project, with low, medium and high CO₂ price scenarios⁵) and comparing them to the maximum rate of return on the risk free assets in Georgia makes it possible to determine how price of CO₂ can influence the investor's decision making process. It is assumed that Treasury bond issued by the Ministry of Finance of Georgia is a risk free asset⁶.

Chart 1 below represents Internal Rate of Returns (IRRs) for the 3 different size potential HPP projects⁷ in Georgia.

⁵ The prices of the CO₂ is extracted from the Synapse research paper that forecasts CO₂ prices for 30 year time horizon [5].

⁶ A Treasury bond is a medium-term coupon government security issued by the Ministry of Finance of Georgia. Treasury bonds are issued with maturities from 1 to 10 years, with coupon payments made every six months. The maximum rate of return on the treasury bonds - 15,9% in Georgia was observed on 8 September, 2010 [8].

⁷ IRRs for those HPP projects might be substantially different compared to standard power plant modeling results, because those numbers are got under the several assumptions which I have made since those assumptions reflected some characteristics of Georgian power market. For example project life time is divided in two parts "planning horizon" that is investor's subject of interest and far future –"salvage value". "Planning horizon" in my calculations is assumed to be 20 years and consequently revenues from those years are counted.



The important measure of profitability that could affect inventors' behavior is the marginal increase of IRR caused by implementation of CDM projects. As one could observe, this change is not large especially when there is low price of CO₂, as depicted on the graph. However, when the prices of CO₂ are high, then all three projects have higher rate of return than risk free assets. Positive difference between risk free assets and those IRRs can be perceived as a risk premium for some investors.

Based on this analysis, it is clear that implementing CDM project has small value added if the price of the carbon credits is not high. Additionally, the Kyoto protocol ends in 2012 and it is difficult to predict what will be the future of the environmental projects and moreover, price of carbon credits. To conclude, financial benefits from CDM projects could not be counted as reliable (because of uncertain carbon prices and ending of the Kyoto protocol) and, therefore, it would not have significant influence on an investor's decision making process invest money or not. Other sources, including improving enabling environment, should be explored in order to encourage investments in hydro power projects.

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