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# A Policy Paper on Financing an Alternative National Energy Strategy for a Developing Country (2013)

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**Abstract:** *The Republic of Moldova's energy sector faces major challenges emanating from a general lack of indigenous alternative energy sources; poor efficiency of energy distribution; limited sources of energy import for oil and electricity and very high costs energy import costs. Currently 96.3% of the energy is imported from Russia and Romania. This paper answers the question of whether heavily investing in interconnection with and integration to the EU energy market is the best option available today to the Government of Moldova to improve efficiency in the country's energy sector. This assessment is done in light of the major challenges facing the energy sector in Moldova in relation with security and independence of the energy source, efficiency, sustainability and environmental impact, access and price and political feasibility. Policy Option 1: Maintaining the status quo With this politically feasible option, Moldova effectively incurs all the costs related to its extreme dependency on imports of fossil fuel from Russia characterized by one of the high gas prices in Europe and the consequent accumulation of foreign debt, inefficient distribution networks and continuous threats to the security of supply from Russia who have refused to renew its multi-year energy agreement with Moldova. Policy Option 2: Pursuing European Union Integration. By becoming part of the Free Trade zone of European Union Moldova will gain access to a customs free zone and a joint operational program with Romania leading to the development of the Ungheni–Lasi Pipeline which will help to the transition to electricity and give Moldova the capacity to negotiate price reduction. The new pipeline will reduce energy dependence on Russia in the long term, although Moldova would have to weather the storm of discontinued supply from Russia in the short term. However, the conditions for meeting EU standards will be very demanding and costly in the short run for Moldova. Policy Option 3: Pursuing a Pro-Russia Policy A Pro-Russia policy would immediately remove concerns about potential punitive measures from Russian thereby enhancing security and greatly reducing the price of energy in the short term. It is however, difficult to predict long term prospects of Russian energy policies. Inefficiency of the system will remain the same as the burden of improving this still lies with Moldova. The strongest barrier to this policy would be the wide spread democratic aspiration expressed by Moldovan citizens since the regime shift from communists to a pro-EU majority coalition in 2009. Policy Option 4: Shifting to Renewable Energy Sources. Moldova has a high renewable energy potential with a technical capacity to more than meet the total energy requirements according to 2010 estimates. In the long-term renewable energy represents the biggest potential at significantly reducing Moldova's dependence on foreign energy, enhancing security of supply, reducing the costs of energy and ensuring a sustainable and environmentally friendly option through huge reductions in carbon emissions. This policy will require high levels of investment in the short term before the benefits of it can be realized.*

**Keywords:** Policy paper, national energy, strategy, developing country

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## **INTRODUCTION**

According to Barbone et al. (2013). Energy has been identified as very fundamental to development in the new economic order. While many countries are searching for alternative energy sources, traditional fossil fuel such as oil, natural gas or coal still remain the most significant sources of energy. Because of the various constraints face by developing countries to balance their economies and meet international competition, many are engaging into various energy policy options analysis to enable optimal energy distribution into their domestic markets.

### **Background on the Current Energy Position in Moldova**

The Republic of Moldova borders Romania on the west and Ukraine on the north and delineating the territory on the South is the Black Sea. The country has a long history of occupation from the Ottoman Empire in the 16<sup>th</sup> Century, the Russian Empire in 1812, unification with Romania in 1918 and ultimate incorporation into the Soviet Union after the Second World War. Moldova became an independent republic in 1991. Moldova has a poor natural resource base with land as its main productive resource. As a result of this, the country almost entirely depends on imports to satisfy its manufacturing and consumer energy requirements. The most conservative sources estimate that currently 96.3% of the energy is imported from Russia and Romania. Before independence, Moldova relied on direct and indirect subsidies from Russia to keep its energy costs down. Following independence, Russia discontinued the subsidies leading to a constant increase in the price of energy and the consequent accumulation of debt to foreign energy supplies by Moldova.

In 1991 the Government of Moldova made a commitment to reform its energy by increasing the security, diversification of its sources of energy and working to attract more investment in the sector. Currently the sector faces challenges emanating from a general lack of indigenous alternative energy sources such as gas, oil or coal; poor efficiency of energy due to old distribution networks and generation infrastructure resulting in 12-25% losses in energy; limited sources of imports for oil and electricity and very high costs for importing energy which are resulting in a supply deficit with crises peaking during the winter months.

In response to the volatility of gas import prices, the government set up the National Agency for Energy Regulation (ANRE), which is responsible for negotiation of prices with foreign suppliers and setting price and tariffs for gas, electricity and thermal energy within the domestic market. The enactment of a Law to harmonize the energy sector with EU standards in 2010 is a significant progress in bringing efficiency to the sector. However, in the absence of locally generated energy sources and the heavy depended on imported energy, energy efficiency and the exploration of alternative energy sources is a strategic issue for Moldova. A key question that has dominated Moldova political life is whether Moldova should maintain its link with Russia and the Commonwealth of Independent States system (CIS) or seek integration with Europe through the European Union.

Between 2001 and 2009 Moldova had a communist government which was elected on a Pro-Russian platform. In 2009, a democratic government was elected with a view to integrate the country into the European Union. Following this change of Government Russia increased the price of natural gas exported

to Moldova. More recently, Russia has also placed embargos on imports of produce from Moldova. The Russian factor is one of the main reasons why it is taking so long to implement the energy community's commitments to allow more harmonization with the European Union. The Russian Company Gazprom, the largest supplier of gas through its subsidiary Moldovagaz, which also controls the distribution network for gas, is interested in maintaining the status quo (Government of Moldova, 2013).

### **Energy Policy Issues in Moldova:**

The Republic of Moldova has adopted as Energy Strategic Plan that is meant to guide the orientation of the country's energy sector development policies until 2030. That strategy paper underlines the need for Moldova to improve energy efficiency by almost every available standard, a vision grounded on a multidimensional evaluation of the current situation, where these few key issues are identified and outlines among others:

- Heavy dependency on energy imports and induced vulnerability for Moldova
- Heavy dependency on fossil fuels, especially natural gas,
- High energy import prices and induced volatility in the domestic market,
- Need to balance household consumption and industrial use,
- Need for active price regulation policies and subsidies to ensure access at affordable energy,
- Willingness to comply with European Union regulations,
- Sharp sustainability and environmental issues.

To improve efficiency in its energy sector, the strategy that is being currently favored by Government of Moldova leans toward achieving, within very short time limit (by 2020), full "integration in its electricity and natural gas markets into the EU internal energy market".

### **Policy Problem Statement**

This paper is set to analyze whether heavily investing in interconnection with and integration to the EU energy market is the best option available today to the Government of Moldova to improve overall efficiency in the country's energy sector. To make our analysis as meaningful as possible, we obviously rely on the priorities and policy goals expressed by the Government of Moldova, but also consider any element that we will deem relevant to the issue, in particular with regards to political and economic feasibility of the option policy option.

In that respect, one important factor to bring into the analysis is potential third party actions that would be the result of any specific energy strategic option adopted by the Republic of Moldova: in that respect, Russia obviously looms large in our mind, but other actors as the EU with its set of intricate and demanding regulations, or Ukraine and Romania as the exclusive transit points of any energy import to Moldova, are relevant as well (Government of Moldova, 2013)..

For a fact, direct or indirect consequences of such third-party actions tend to have been overlooked in previous governmental studies.

## **Policy Analysis Method**

Adopting a broad range of evaluation and measurement criteria to capture not only internal but also external drivers to Moldova's energy policy options is critical, as it comes to dealing with the choices of a small, relatively poor, landlocked country, caught besides between the two economic and political global giants that are Russia and the EU. Notwithstanding, such objective 'fragility' is by no means an implication that a sovereign country with a rich history and legitimate aspirations to a better economic future should renounce pursuing its own interest in the best way in can.

In an attempt to come up with a balance approach to all the determinants of Moldova's energy options, we decided to adopt the following set of evaluation and measurement criteria:

**Security and Independence:** This is meant to reflect the way and the extent to which Moldova can secure availability of the total energy supply needed to match its domestic demand and economic growth policies. Along with the mere 'security' of supply aspect, this criterion needs also to weigh in the potential trade-offs to be made in terms of economic and political independence.

**Efficiency:** This is meant to capture mainly the efficiency of supplies of energy within the domestic market, the total welfare derived by consumers from energy consumption and relating externalities, as well as potential deadweight losses resulting energy price of supply and demand.

**Sustainability and Environmental Issues:** This is meant to capture mainly the externalities resulting from the Moldovan market energy mix, since those externalities are usually not reflected in the market energy prices. This measure also captures potential positive externalities that could be gained from such policies as producing energy out of waste production, beyond the mere quantity of energy supplied.

**Access and price:** Access is indirectly captured in part under the criterion of 'security and independence above'. Price, in turn, is indirectly captured in part under the criterion of 'efficiency' above. Notwithstanding the above, we deem critical to weigh in the salient and mainly foreign-determined non-market drivers that affect and occasionally disrupt Moldova's access to energy (such as an Ukrainian decision to cut the transit pipelines that supply Moldova with more than 2/3 of its domestic consumption) and price of that energy (such as a Russian decision to multiply overnight the by almost 5 the unit price of energy supplies that account for more than 4/5 of Moldova's domestic consumption). Such events, made all the more important by the fact that Moldova location as a landlocked country largely limit the availability of alternative response options when they occur, obey to a Poisson – rather than a normal – distribution, and are therefore warrant to have their factors considered on a separate basis from the previously mentioned criteria.

**Political feasibility:** This is meant to capture the internal political feasibility of each option, but the external political feasibility as well, since many of the options consider heavily rely on – and can sometimes trigger – foreign actor policy decisions, which Moldova typically has scant control upon.

### **Option Comparison and Grading Method:**

Thorough consideration of the key elements in play within each of the 5-category set of evaluation and measurement listed above allowed us to determine four relevant energy policy alternatives that the Government of Moldova could reasonably elect to follow:

- Policy Option 1: Maintaining the status quo
- Policy Option 2: Pursuing European Union Integration
- Policy Option 3: Pursuing a Pro-Russia Policy
- Policy Option 4: Shifting to Renewable Energy Sources

Each of the aforementioned four energy policy options is analyzed in depth using both quantitative and qualitative data, and discussed against our set of evaluation and measurement categories. That analysis portion, which forms the main bulk of this paper, aims at providing policy makers with the full range and detail of the relevant drivers and specific key-issues than can allow them evaluate each option on its own merits, by following a simple benefits-cost analysis principle.

However, to provide convenient comparison across various options, we provide at the end of our option per option detailed analysis a general comparative table where each option is graded on the full set of criteria considered. For that purpose, we determined a grading scale ranging from 1 (worst) to 20 (optimal), which allows us to generate total on 100 and yield immediately comparable overall grades for the four options. One important remark regarding the grading system is that we deliberately assume equal weight for each of our five evaluation and measurement categories. Reality is that policy makers may have their own preferences and priorities across those criteria. We leave it to them, in that case, to put different weighting coefficient of their liking to the various criteria graded, and thus come almost as conveniently to a set of scores equally convenient to compare, and yet more reflective of their own policy priorities and preferences.

## **ANALYSIS OF OPTIONS**

### **Policy Option 1: Maintaining the Status Quo**

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The first option offered to Moldova is to keep its energy policy unchanged. The *status quo* situation that would result from such choice would obviously have the advantage of very high feasibility, at it would not involve any specific need to invest resources into changing the current outcomes of Moldova's energy situation.

In the *status quo* situation, Moldova is at the same time heavily dependent on Russia and heavily leaning toward the EU. The major drawback of that *status quo* situation, however, can be summarized in the fact that Moldova effectively incurs all the costs related to its extreme dependency on imports of fossil fuel from Russia, without drawing any of the substantial benefits it could draw from a true partnership policy approach vis-à-vis Russia.

To further illustrate the point above, we run below a detailed analysis of the benefits and cost relating to keeping the *status quo* Energy policy situation for Moldova.

### **Security**

Security of supply is quite low in the current situation for Moldova. As appears in the background, the country's energy situation is extremely on imports from Russia, in particular natural gas imports.

The fact is that since 2009 and the Moldova's shift to a democratic, pro-European regime, relations political and economic relations with Russia have greatly deteriorated over time. That situation has been made even worse, besides, by the numerous steps taken by Moldova towards future integration to the EU. Each and every time, Russia has responded to such moves by threatening Moldova of retaliatory measures that could go up to shutdown of Russian natural gas supplies to the country. Such a situation puts distinct shadow on the prospects of Moldova continued and secured access to potential Russian energy sources, with represent today up to 90% of its domestic consumption. At present, there is no multi-year supply contract effective between Moldova and Russia, as the latter has been refusing to sign a new agreement since the expiry of the four-year deal that had been valid until 2011, to manifest its strong opposition to Moldova-to-Moldova decision to pursue interconnection to the EU energy network (an alternative option considered later on).

A second point that is hurting energy security prospects for Moldova in the *status quo* situation is that Moldova is exposed to all the major context fluctuations involving Russia and Ukraine. That is due to the fact that Moldova is landlocked, as shown in the background, and need for that matter to have its Russian energy imports transit through Ukraine. For instance, Moldova suffered severe energy shortcuts in 2009 when Ukraine decided to cut all Russia originated energy transit through its pipeline system to retaliate to Russia having decided to cut natural gas exports to Ukraine (OECD, 2008).

### **Efficiency Analysis**

On the efficiency aspects as well, the *status quo* situation does not seem very desirable for Moldova. The Moldovan energy infrastructure current situation would actually need to be addressed through massive energy saving investments in order to improve efficiency in supply and distribution. For instance, some sources have evaluated the present heat loss in important parts of Moldova's thermal power generating system to up to 19-21%.

Table 1 below provides broader view of the magnitude of energy losses in the Moldovan figures. The study is now a little old, but since no large-scale total energy infrastructure and system revamping investments has been made since then, it is safe to assume that the magnitudes provided are still relevant:

Table 1: Energy Losses in the Moldovan Energy Economy

	1990			1995		
	Absolute losses (1 000 toe)	Losses compared to input (%)	Share of total losses (%)	Absolute losses (1 000 toe)	Losses compared to input (%)	Share of total losses (%)
<b>Total losses</b>	<b>6,637</b>	<b>64.2</b>		<b>3,094</b>	<b>65.0</b>	
Fuel losses during its transportation	45	0.8	1.3	212	4.4	6.8
Heat generation losses	376	14.5	5.7	230	16.7	7.4
Losses in the electricity generation process	2,205	64.5	33.2	1,034	70.0	33.4
Losses in the thermal energy networks	200	9.1	3.0	150	13.1	4.9
Power losses in the grid	105	10.7	1.6	123	19.1	4.0
Losses in final consumption	3,666	49.5	55.2	1,345	44.7	43.5

*Source: Prepared from: Energy consumption in the Republic of Moldova. Trends. Informative bulletin, January 1997.*

In addition to such massive losses, there is significant deadweight loss caused by Russia taking advantage, in particular since 2009, of its ‘natural monopoly’ position in energy supplies to Moldova to set the price too high a price and even sometime favor shortages (UNECE, 2009).

### Sustainability and environmental issues

With regards to sustainability and environmental issues, it is a fact that Moldova is overwhelmingly reliant on imported fossil fuel energy sources, and in particular on natural gas, but also petroleum products and coal. Neither of those predominant sources is generally considered a non ‘clean’ or ‘green’ energy products. Besides, Moldova’s aging energy infrastructure network favors energy losses and leakages of any kind, which comes to further hurt the assessment of Moldova’s *status quo* situation under the criteria of sustainability and environmental issues.

Clearly, if Moldova intends to make any significant progress improving the sustainability and environmental-friendly outcome of its whole energy policy, it would need to engage into specifically targeted policy reforms, that take money and time altogether, and really provide results in the long run (Rezvani, 2013).

### Access and price

As mentioned in the background, Moldova relies on anywhere between 96% and 99.5%, depending on sources, on imported energy. Approximately 90% of those imports are from Russia. Besides, natural gas forms over 50% of the said imports from Russia. At present, Moldova pays \$382 (not counting in marginal price variations) per thousand cubic meters, which is among the highest prices charged by Russia to any country for its energy supplies. Actually, the price even peaked to \$392 in 2012, which is significantly higher than the price charge for imports from most of the EU member countries. The very high price policy applied by Moscow to Moldova since 2009 has significantly hampered Moldova’s ability to address its energy consumption needs (UNECE, 2009)..

Besides, the high level of energy import price available to Moldova has incentivized public authorities to use subsidy policies to provide affordable access to final consumer and various businesses. Those policies, required as they may have been from political or social standpoint, have actually created huge hidden costs in the Moldovan domestic market price of energy.

A very visible consequence of heavy reliance on energy imports coupled with sharp increase of the price, however, has been a very rapid increase of Moldova’s energy dependency generated public debt. Such an increase of Moldova’s debt has in turn pushed Moldova dependence on (Rezvani, 2013)

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## **Policy Option 2: Pursuing European Union Integration**

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Taking the current economic and political challenge facing Moldova, especially in relationship with Russia, the government of Moldova is seriously thinking about an energy option with European Union. As a member of the Commonwealth of Independent States (CIS), an organization of countries within the former Soviet Union, Moldova is finding its present European Union move very indicting to its present economic powerhouse. Russia has been skeptical about the April 27<sup>th</sup> 2010, Romania Moldova strategic partnership, a plan which should pave the way for an accelerated European Union Integration move for Moldova.

### **European Energy Option general description**

According to Eurostat (2010), Europe has five major energy sources; nuclear energy, solid fuel, national gas, crude oil and renewable energy. Europe electricity consumes 36.7% Oil, 24.6% gas, 17.7% Coal, 14.2% Nuclear, 6.7% renewable and 0.1% industrial waste. As at January 2010, 14 out of 27 countries have nuclear reactors. Even though some countries are shutting down some of their reactors temporarily following the incident of the earthquake in Japan, a growing number of countries are seeking the nuclear energy source. As at Jan 2013, Europe as a whole (excluding Russia and including Ukraine) has 152 reactors producing 161,992 new capacities with 6 under construction, that are expected to produce a further 15,179 net capacity. This includes 15 reactors of Ukraine and 2 under construction producing a net capacity of 63,130. Research indicated that the European gas market is growing, as at 2009, Natural gas consumed by sector was 27% power plants, 4% industry, 39% residential & Commercial and 305 others. According to Reuters (2013), European gas is expected to increase by 10% each year to 580 billion cubic meters (bcm), and about 55% of Europe natural gas is imported from Russia and Algeria. European Union produces 37% of its own gas energy. EU coal is coming from different sources, but with Columbia and Russia standing as European biggest coal suppliers. The European Commission Eurostat (2012) noted the following sources. 26.7% from Russia, 24.9% Colombia, 19.0% United states, 8.1% Australia, 6.9% south Africa, 4.7% Indonesia and 9.7% from other sources. On the other hand, European Union oil consumption grown from 679 million tons from 1995 to 756 tons in 2012.

### **Moldova and the European Union option**

Our current policy is assessing Moldova's European Union moves on security and independence, efficiency, sustainability and environment and Access and Price. The current energy institution framework of Moldova seeks to implement a policy that will create a competition that will improve a broader market access and hence stability within its energy sector.

### **Security and Independence**

As the Moldova government seeks markets competition in its energy sector, the European markets will be able to provide access to alternative energy sources. This will in turn create more efficient, reliable and secure energy source. The European Union published a green paper in March 2006, as directives for its membership in its entire jurisdiction to follow and comply with. One major advantage that Moldova seeks to address with the EU policy is energy independence. The new pipeline will reduce energy independence on Russia. The Moldova government will be able to improve energy efficiency and renewable energy

source from 6% in 2010 to 20% in 2020 by further of it the Domestic energy sector. A lot of issues have been dealt with regarding energy improvement within the block. Part of the EU requirement for Moldova requires that Moldova to create an open economic forum and create a free trade, the legal requirement of the EU will also give Moldova access to international markets including Turkey and Western Europe.

These include issues like energy market integration and greenhouse emissions. According to European Union energy policy data in the Commission Staff Working Document, “Moldova has been a signatory to several international agreements, including;

- The energy commission of European Union (May 2010)
- The United Nations framework convention on climate change, UNFCCC (June 1995)
- The Kyoto protocol
- The Comprehensive Accord (2010)”

Meanwhile, while access to the European competitive market will provide a broad option for Moldova, the conditions to European union integration as outlined in the 2009 establishing an agency for Corporate Energy regulations, can be very demanding in the short run for Moldova. The agency outlined four key areas of the integration process;

- The framework guidelines
- Networks codes
- The electricity regional initiative the infrastructure and network development and
- The marketing monitoring

Presently, Moldova energy depends 100% on Russia, with Gasprom controlling more than 50% of the shares in the Moldovagas, the Moldova gas company where the government has only 35.33%. Russia also has 344 registered companies in Russia with 28% export to Russia. Because of the current economic involvement, Russia also plays a key role in Moldova’s internal affairs with a presence of 1,500 troops in the Transnistrian Region.

### **Sustainability and Price Issues**

By becoming part of the Free Trade zone of European Union, the Moldova will become part of a free trade zone and get access to a customs free zone especially from Turkey. Moldova will also achieve a joint operational program with Romania that will lead to the development of the Ungheni –Lasi Pipeline. This will promote the transition of electricity and hence give Moldova the capacity to negotiate price reduction. Research has suggested that there will be 1.5%-% growth in production cost of agricultural product but they will be a positive return to the Moldova economy in terms of cost benefits and an open European Market will competitively open Moldova trade market. The table below shows the current cost of Moldova from 2007 to 2009 (UN/Economic Commission for Europe, 2009).

**Table 2: Ukraine Energy**

	2007	
	GWh	USD/MWh
Electricity import from Ukraine	2931	29.8
Cuciurgan (Transnistria)	0.5	-
	2008	
Electricity import from Ukraine	2958	46.6
Cuciurgan (Transnistria)	4	41.8
	2009	
Electricity import from Ukraine	7	52.4
Cuciurgan (Transnistria)	2934	57.7

**Source:** Moldova Energy policy 2012

According to the 2011 Energy Policy of Republic of Moldova, renewable energy sources will introduce a feed-in-tariff for a term of 15 years. “This will create the following options;

- Guaranteed grid access
- Long-term contracts for the electricity produced
- Purchase prices that are methodologically based on the cost of renewable energy generation and tend towards grid price
- Creation of Energy Efficiency Fund”

To facilitate the pipe line, the Euro will provide \$ 9.38 million, which is 33.5%. Other economic benefits include;

**Table 3: Moldova Energy Import**

Cancelling Moldova Customs duties for imports from EU and Turkey	0%
Increase in export prices for Moldovan products on European markets	5%
EU Moldova’s industrial products tariff	0%
Increase of export prices for Moldova Agricultural sector production	20%
Cancelling Moldova Customs duties for imports from EU and Turkey	0%

**Source:** Moldova Energy policy 2012

Alternatively, Russia is ready to negotiate prices with Moldova and provide additional incentive to prevent the EU Russian deal. Russia plans to reduce the price of Moldova’s oil per liter as it is with Belarus at present. That element, by itself, makes it worth for Moldova to consider other options regards to the access price to energy imports.

### European Regulations

Moldova EU integration has to be met with the compliance of important regulations and directives. This includes the harmonization and standardization of economic and legal environment into which all the

jurisdictions should be able to operate within. These regulations include; incorporation into Moldova Laws the framework guidelines for electrical systems operates. This take into accounts various technical and ethical considerations in line with the Article 37 (6) of Directive 2009/72/EC, and the conditions for networking supplies lines and cross border electricity distributions. The EU integration requirements also require the withdrawal of Russia's troops for Moldova's Transnistrian Region and the incorporation of EU into the negotiations process within the Region.

On the other hand, Russia is proposing a multidimensional economic and political corporation, which also involves key security issues and the protection of the regions cultural heritage.

### **Policy Option 3: Pursuing a Pro-Russia Policy**

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As repeatedly mentioned in this study, Moldova is overwhelmingly reliant on imports to meet its domestic demand for energy. In fact, the precariousness of Moldova's dependency on foreign energy is made even more by the fact that Moldovan imports consist predominantly of one single fuel type – natural gas –, originates almost exclusively from one single supply source – the Russian Federation –, and almost necessarily piped through one single channel – the Ukrainian oil and gas transit system. Instead of just bearing such necessary heavy dependency on Russian trans-Ukraine transiting natural gas as a natural burden, one strategic energy option available to Moldova is to actually actively enhance and leverage its relations with Russia in order to improve its overall energy situation. Such alternative is what we call a 'Russia-Enhanced Energy Option' for Moldova.

To consider the merits of such alternative, however, we need first to specifically shed light on the general context and the main drivers of Moldova's relations with Russia, when it comes to energy issues.

#### **General context of Moldova's dependence on energy imports from Russia *via* Ukraine**

Various sources already cited in this paper sometimes exhibit slight figure variations, but all concur to the same admission of severe dependency on foreign energy. That situation somehow appears as a fatality, considering that Moldova is usually characterized by European standards as a small, poor, landlocked country devoid of natural resources.

As a matter of fact, Moldova's current energy needs and energy production capabilities are utterly disproportionate. To illustrate the point, the table below provides a comparison between total primary energy consumption and production in Moldova from 2000 to 2010.

**Table 4: Total Primary Energy Production and Consumption in the Republic of Moldova**

MOLDOVA - Total Primary Energy:		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Consumption	(Billion Btu)	110,140	107,280	118,960	130,500	122,680	129,300	138,270	128,510	133,510	118,660	118,600
Production	(Billion Btu)	580	740	1 220	650	580	620	2 600	330	80	530	760
Production	(%)	0.53%	0.69%	1.03%	0.50%	0.47%	0.48%	1.88%	0.26%	0.06%	0.45%	0.64%

Source: The U.S. Energy Information Administration (EIA); <http://www.eia.gov>

Note: 1 million Btu (British thermal units) = 39.6832 metric tons of TOE (Metric Tons of Oil Equivalent)

As we can see in the bottom line of Table 4, the ratio of Moldova's domestic production of primary energy to the countries overall annual consumption has been consistently almost insignificant on the full range of data provided.

The fact is that there is a direct link between Moldova's over 99% dependence on foreign energy sourcing and the countries strategic position vis-à-vis the Russian Federation as regards to energy policy: more than 90% of the country's energy imports consists of natural gas, oil and coal imported from Russia. As mentioned earlier, natural gas alone accounts for 50% of Moldova's total energy imports and originates at basically 100% from Russia.

An additional issue for Moldova comes from the fact that natural gas in quantity relevant to country-scale consumption, albeit only a small one, needs to be transported and dispatched by pipelines. Owing to Moldova's landlocked location, all natural gas imports from Russia chance to necessarily transit *via* pipelines across Ukraine. As a result, Moldova's energy imports are not only vulnerable to Russia, but also to Ukraine. Indeed, increasingly frequent tensions between Russia and Ukraine since that latter country's 'Orange Revolution' in end 2004 – early 2005 have been regularly inflicting collateral damage to Moldovan energy imports in recent years.

### Effects of Russian influence policies on Moldovan energy availability and price

Due to Russia's current position as a natural monopoly supplier of energy to Moldova, its policies can directly affect both the price and the quantity of energy available to Moldova at any given moment.

Russia monopolistic privilege is exerted mainly by fixing the price and regulating the supply of natural gas. The reason is that natural gas does not exhibit the characteristics of a global market with a unique price. Besides, shifting promptly to alternative suppliers is next to impossible, especially in the case of Moldova, as it requires heavy and time-demanding investment in pipeline networks, provided that such alternative sources exist at economically feasible cost. In other words, in the natural gas market, the short-run is counted rather in decades than in years!

For that reason, Russia can firstly pick up at will the price it charges to Moldova for its natural gas imports. That is actually the main leverage instrument it has been using to affect Moldova's energy policies. The

price charged by Russia to Moldova peaked to \$392 per thousand cubic meters, and maintained an average level higher price than the average charged to EU member countries. By comparison, the price charged in 2009 was \$90 per thousand cubic meters, being a 436% increase. The main reason of such unfriendly price evolution is the shift of the Moldovan regime from a communist administration to a 'pro-European' coalition.

In addition to setting up the price, Russia has secondly used its monopolistic position by reducing or cutting supplies, in particular during periods of high demand, in order to exert political and economic pressure on Moldova. In that respect, in the current EU-leaning energy strategy adopted by Moldova, Russian officials have repeatedly warned the country of possible reduction of supplies as a means of retaliation.

At last, beyond direct action, Russian energy policy indirect effects Moldova and can inflict severe collateral damage to the country. This has been particularly true for Russia-Ukraine tense political and economic relations. During the winter of 2009, Ukraine responded to Russia's decision to cut its natural gas supplies by cutting transit through its pipeline system in order to serve its domestic demand. As a result, Moldova (but also other heavily Russian energy dependent countries supplied through Moldova) found themselves in severe shortage in moments where the temperature was hitting its lowest levels.

As it appears, Russia has therefore the ability and the willingness to directly and indirectly affect the outcomes of Moldova domestic energy issues by determining the price or the level of supplies. That obviously raises sharp security concerns for Moldovan energy strategy and affects the overall political context driving Moldova's policy choices.

### **The political context and issues relevant to Moldova's 'Russian' energy policy**

Historical relations between Moldova and Russia have already been stressed in the background, and it is enough to remind here that Moldova gained independence from the former Soviet Union only in 1991. In that respect, it is still a very young country, as are all so-called CIS countries in general. The main consequence of that point is that Moldova, and most of the said CIS countries, for that matter, have not enjoyed to date the required combination of time, resources and structural policy reforms needed to engage in and bring to achievement deeply infrastructure landscape transforming investments.

More specifically, regarding the situation of Moldova's energy, the whole infrastructure network and supply system had been designed in the context of the Soviet Union, and as such, exhibits deeply rooted subordination characteristics with regards to Russia, which is the 'natural' state successor of the former Soviet Union, albeit exerting formal sovereignty over a more restricted area. Since 1991, Russia's has stated and demonstrated it keen willingness to keep Moldova within its zone of influence. As a result, there seems to be no major domain of Moldova's interior policy that is regarded as 'neutral' by Moscow, and energy policy makes no exception to the rule, quite the contrary. Energy is indeed one of the major leverages of Russia for keeping influence over Moldova, as demonstrated above.

In particular, Moldova's willingness to turn its back to Russia and lean toward the EU has proven a very sensitive issue for Russian authorities. Moscow has indeed proven determined to use every instrument that can prevent such a strategic move. For instance, Russia has promised Moldova to apply an immediate 4 to 5% price reduction on all its natural gas imports if Moldova renounces its EU interconnection plan.

At the same time, as already mentioned earlier, Russia is threatening Moldova with extensive retaliation – namely, reduction of supply and/or increase in price – if it decides do to otherwise and keep on pursuing enhanced relation to the EU system and market. That is evidence enough that Moldova’s situation vis-à-vis Russian energy imports would at least sharply deteriorate for a foreseeable future. The result is that there is no option offered to Moldova, where Russia would just stay ‘neutral’ and ‘inactive’ in reaction to the strategy it will be implementing for its energy policy.

The situation of Moldova is made more complicated by the Transnistria impasse. The trouble region is already under *de facto* occupation by Russian troops. In addition, however, Moscow is keen to take diplomatic pretext of having to protect the rights of Russian minorities in Transnistria to actually enhance its influence and militarily, politically and/or economically further step into Moldova’s domestic affairs.

It is worth reminding here in addition, with regard to Russia’s ‘hyperactive’ take in Moldova’s energy policy shaping and management, that Moscow has been refusing to sign a medium to long renewal or extension contract on gas supplies to Moldova since the expiry of the previous four-year deal.

As a matter of fact, Russian overall policies will be either ‘friendly’ or ‘antagonistic’ vis-à-vis Moldova depending on the latter’s domestic political options. That is actually what truly provides Moldova, in turn, with non-insignificant leverage over Russian energy policy: a ‘Russia-Enhanced Energy Option’ strategy would divert from the *status quo* situation and improve Moldova energy situation to a large extent. At the same time, the political price to pay would be very also significant.

### **Benefits-Costs analysis of a ‘Russia-Enhanced Energy Option’ for Moldova**

Here is how we can rate the benefits and the cost of a Moldovan energy policy that would repel its EU bent, move back toward active restoration of excellent relations with Russia on energy, and leverage those relations to improve the countries energy situation:

#### **Security and Independence**

Security would be greatly enhanced in the short and medium run as regard to Moldova’s ability to meet its current energy consumption. Firstly, a step toward Russia would immediately remove concerns about potential punitive measures from Russian authorities on the ground of Moldova too obviously ‘EU-leaning’ rated energy policies. Secondly, it would secure supplies in the medium run, as Moscow would be willing at last to sign a new multi-year natural gas supply contract with Moldova, an agreement it has been refusing to sign since 2011.

One structural relief in terms of energy security is that Moldova, improving its relations with Russia on energy issues, will put itself in position to no-longer suffer the damage of direct access restriction from Russia through price increase or quantity reduction, but only potential side effects of Russian overall energy related issues with third countries, Ukraine in particular.

The long-term prospects of such policy ‘Russia-Enhanced’ strategy are more difficult to assess, however, as it will always help to further increase the already overwhelmingly heavy dependency of Moldova on energy imports from Russia. The fact is that Russia ‘hyperactive’ energy policies are difficult to forecast and predict, due to the numerous non-economic drivers they respond to. Over the last decade, Moscow has demonstrated beyond argument its willingness, and even propensity, to change its energy policies

overnight not-only vis-à-vis Moldova, but also other former CIS countries (UN/Economic Commission for Europe, 2009).

### **Efficiency Analysis**

On the efficiency issues, the ‘Russian-enhanced’ strategy will not have any effect on improving the supply system issues. The infrastructure is as is and would need to be addressed through specific energy saving investment. This means, for instance, that the up to 19-21% heat loss identified in the systems operated by some of Moldova’s thermal power generating companies and the massive overall losses detailed to in the status quo option analysis earlier will remain the same unless addressed separately.

Table ... below provides broader view of the magnitude of energy losses in the Moldovan figures. The study is now a little old, but since no large-scale total energy infrastructure and system revamping investments has been made since then, it is safe to assume that the magnitudes provided are still relevant:

As a consequence, the main increased efficiency benefits regarding the ‘Russia-Enhanced’ strategy will mainly consist in a very significant reduction of the deadweight loss originating from Russia setting too high a price and/or too low quantities supplied for its natural gas exports to Moldova in the current situation. That point will be addressed in greater detail when we specifically consider the price below.

### **Sustainability and environmental issues**

With regards to sustainability and environmental issues, the ‘Russia-Enhanced’ strategy will not bring any significant benefit, due to the fact that Moldova would be still overwhelmingly reliant on imported fossil fuel. Quite the opposite, a lower price and increased quantity supplied would be likely to generate higher consumption of natural gas, but also petroleum products and coal, thus increasing the negative externalities generated by the predominant use of non ‘clean’ or ‘green’ energy products.

There again, any potential progress would need to be specifically targeted by separate policy.

### **Access and price**

The major gains of a ‘Russia-Enhance’ strategy would be made by Moldova in the access to and price of energy. As mentioned earlier, Moldova relies on anywhere between 96% and 99.5%, depending on sources, on imported energy. Approximately 90% of those imports are from Russia. Besides, natural gas forms over 50% of the said imports from Russia.

At present, Moldova pays \$382 (not counting in marginal price variations) per thousand cubic meters, which is among the highest prices charged by Russia to any country for its energy supplies. Before political relations started to deteriorate between Moldovan and Russia respective regimes as of 2009, Russia had proved willing to accept a price 436% lower for the same type of supply. A spectacular and somewhat extreme case illustration of how much of a price-gain a country can make for ‘good relations’ with Russia is provided by Belarus: the price charge to Russia that country for natural gas imports was as low as \$46 per thousand cubic meters (only 12% of the current price charged to Moldova!) before rising to ‘market price’ until 2007 after the two countries relations deteriorated.

Notwithstanding the aforementioned deterioration, the average price paid by Belarus in 2013 for natural gas imports from Russia was still (only!) \$163 per thousand cubic meters, less than 43% of the average

price charged to Moldova over the period for the same type of imports. This shows indicates what type of negotiation margin Moldova actually has, beyond the 5% immediate reduction spontaneously offered by Russia if it renounces interconnection with EU, provided that the Moldovan authorities are willing to use the leverage of significantly improved relations with Moscow.

Beyond the price, direct access outlook to Russian energy will be also improved by the removal of restrictions and threats of restrictions. So will be indirect access that would take the form of much higher demand resulting from the higher public purchasing power that would result from the shift of Moldova' budget constraint. Moldova would therefore benefit both from income and substitution effects provided by the shift, to reallocate public resources to other areas of needs, for instance by removing the current very high subsidy spending to allow consumers with affordable access to energy.

A last point we will mention that by adopting a 'Russia-Enhanced' strategy, Moldova would also generate positive externalities, mainly in form of a steep reduction of the public debt created by fossil energy imports. That, in turn, could create a much-needed boost to Moldova producing sector, an important feature for a country that has Europe's lowest GDP per capita with \$2,038.

### **Political feasibility**

The greatest issue about a 'Russia-Enhanced' energy strategy for Moldova is about the political cost of such a move. Starting with externally triggered political feasibility constraints, it is safe to assume that such strategy would benefit from strong support from Russia, and thus remove most of the punitive damage that the Moldovan government would have to face as an effect Moldovan consumers' deteriorated access to energy at least in the short and medium run, should Moldova pursue any other policy, and especially any policy signaling Moldova's move toward the EU-market.

To balance the point to some extent, despite the fact that the EU is not quite as active and pushy as Russia may be to affect energy outcomes to Moldova, stepping back from the EU-market toward Russia would imply stepping back as surely from the remote EU-membership perspective that have become more of a reality since Romania accession to the organization.

However, the strongest barrier political against a 'Russia-Enhanced' strategy would be in the very large-spread democratic aspiration expressed by Moldovan citizens and government altogether since the regime shift from communists to a pro-EU majority coalition in 2009. Such determination, which could make any leaning back toward Russia policy unlikely to succeed in a foreseeable future, is evidenced by Moldova's willingness to unyielding take the subsequent numerous hits resulting from its decision to step as much as possible aside from Russian policy influence. The aforementioned sharp increase of energy import prices and greater uncertainty about availability of Russian supplies illustrate the point.

In addition to that widespread EU-bent in Moldova, the fact that Russia is actively supporting the separatist movement in Transnistria, among others by maintaining important ground troop in Moldovan territory, makes it further more unlikely for Moldova to successfully pursue a 'Russia-Enhanced' energy strategy, for all the aforementioned benefits that would be generated by that policy option.

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#### Policy Option 4: Shifting to Renewable Energy Sources

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According to the International Energy Agency, Moldova is heavily dependent on imported energy. Only 4% of the used energy in Moldova is locally generated. This weakens the national economic development as security of supply is strongly depended on sources abroad and pricing negotiations which are further exacerbated by the tag of war between the EU and Russia. Considering the rate at which primary energy resources are imported by the Republic of Moldova, Renewable Energy usage could hold a significant role in the government energy policy. This is why the Renewable Energy potential constitutes a priority for local specialists in order to reduce the national dependence on the importation of energy. The main direction of Moldova's energy strategy is to diversify its primary energy sources, suppliers and routes, improve energy efficiency and develop local energy resources with emphasis on renewable energy sources (World Bank, 2012).

#### Renewable Energy Sources (RES)

The development of renewable energy sources is in its early stages in Moldova which has much more potential for renewable energy and green technologies than are being exploited at the moment.

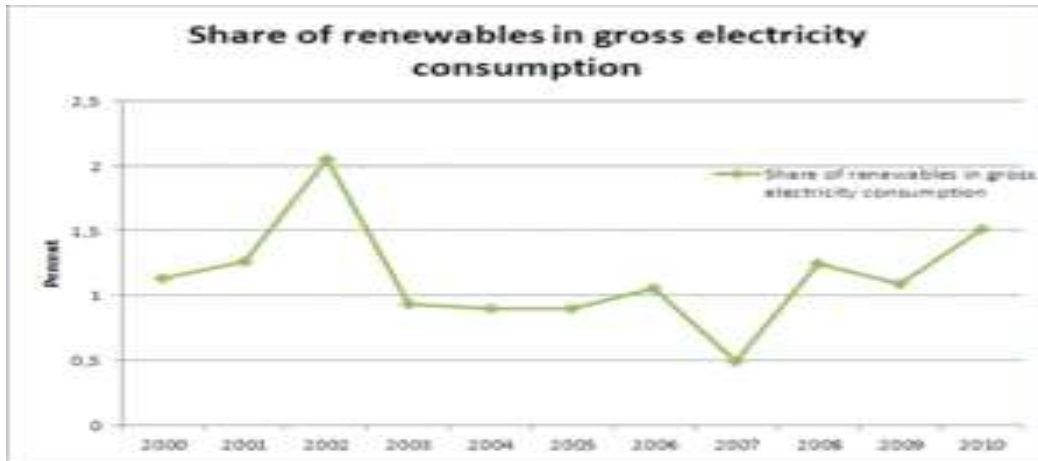
**Table 5: Total Renewable Energy Potential in the Republic of Moldova**

Types of RES in the Republic of Moldova	Theoretical Potential, Mtoe	Technical Potential, Mtoe	Economic Potential, Mtoe
Solar Energy	12,00	1,20	0,90
Wind Power	2,10	0,70	0,50
Biomass	1,00	0,50	0,40
Hydropower	0,45	0,30	0,20
Low-grade Heat Sources	9,50	0,95	0,65
<b>Total</b>	<b>25,05</b>	<b>3,65</b>	<b>2,85</b>

**Source: Moldova Energy policy 2012**

Table ... Gives a summary of current estimates of total theoretical, technical and economic potential for each renewable energy source, expressed in million tons of oil equivalent (Mtoe). The total theoretical potential for RES is 25,05 Mtoe (Republic of Moldova, 2013).

According to the World Bank (2013) the trends in energy demand for Moldova have not varied significantly over the past ten years and in 2011 the total energy consumption for Moldova was 3,330.7 Mtoe. RES as a proportion of annual energy consumption has been on an increase although the increase is marginal. Figure 1, presents trends in RES growth as a proportion of total energy consumption in Moldova.



**Figure 1. Share of renewable**

Source: [www.enercee.net](http://www.enercee.net) 2013

### Wind Energy

The geographic placement of Moldova determines that only some areas on its territory benefit from favorable winds for the development of wind energy systems. According to 2009 United Nations Economic Commission for Europe Report Moldova in 1923 Moldova had 6208 windmills which in the 1960s were replaced with electrical driven motors. Today Moldova only has small wind installations for commercial use with 1 to 2.5 KW capacity. Reports in 1990 based on metrological studies at the Chisinau weather station concluded that Moldova has insufficient wind energy for electricity generation. However, subsequent studies in 2001 disproved this report with findings that the country has sufficient wind energy to generate 11 tons of heat energy per year.

### Solar Energy

According to the renewable energy initiative of EBRD, despite the absence of own traditional energy sources the vital necessity of using alternative energy sources has not been tapped into. Currently solar energy is used for domestic hot water supply, drying fruits, vegetables and medicinal plants and for pumping water and electricity to small consumers. With installations estimated at 102,000 square meters of solar collectors. The significant potential of solar energy generation has however been demonstrated in a Chisinau project which installed 400 solar panels with a combined capacity of 95kw which they connected to the power grid and have been able to generate 136MWH annually.

### Biomass Energy

Main biomass energy sources in Moldova are forestry, agriculture, livestock sector, food industry and residential farm steads. Potential biomass resources therefore include forestry, agricultural residues, organic waste and energy crops such as rape seed. Advanced technological implementation for biomass are gaining momentum due to government support as well as public interest in their potential. Currently more than 59% of households in Moldova use some type of biomass for space heating, cooking or water

heating. This proportion is much higher in the rural areas at 91% compared to urban areas where only 20% of households use biomass energy. Studies show that one of the most secure and easy access alternative source of biomass is straw and other agricultural waste. Wheat straw waste is the biggest short to medium term renewable energy resource. Annually 700 thousand tonnes of straw are produced and these have the potential of generating 700 million KWH of thermal energy every year.

The registered increase in activities contributing to the extensive use of solid biomass for energy purposes are widely supported by the donor community and Moldova's development partners such as International Funding Institutions, European Union, and International Development Agencies of EU member states, USA and Japan. Currently 28.5 MWH on baled straw, fuel wood, briques and pellets have been installed in Moldova. The thrust in this area is to increase biomass energy use in households and public institutions such as schools and health centers focusing on rural areas. There has also been installation of plants for the production of biogas with construction of a biogas plant with a production capacity of 16million cubic meters of gas. Although the potential of bio fuels is currently unknown, estimates show that with the use of 2.5% of total arable land 52,500 tonnes of bio fuel could be produced and this would cover 26% of the fuel needed for agricultural waste. Based on this increasing arable land use to 10% would produce sufficient energy to meet the total demand of agricultural energy.

### **Hydro Energy**

Moldova has two hydroelectric power plants with the capacity of 64Megawatts and six micro hydro stations which have 141kw combined capacity. (more information needed on this one)

### **Electricity**

In 2013 construction of a coal/biomass fired power plant is due to start in Ungeheni with estimated costs of 615 million euros which s being financed by Czech investors. The plant will supply Moldova with 20% of its annual power consumption (750GWH) and an additional 100GWH during emergencies. The remainder of the generated electricity is to be exported to Rumania. Also offered by Czech business are energy projects which would replace old heating systems in public and residential buildings with ones using renewable energy sources. Other initiatives supporting the development of RES is that by the European Bank for Reconstruction and Development which in 2011 signed the sustainable Energy Action Plan. Through this plan technical assistance was provide to Moldova on tariff methodologies reform and renewable energy. And ANRE is working on a roadmap to remove the barriers for development of renewable energy sources Moldova. 20 million euros have been committed under Moldova Sustainable Energy Financing Frameworks for the commercial sector (MoSEFF). It is expected that further investment such as infrastructure and energy projects will require significant technical assistance and investment in the form of grants to ensure affordability and successful implementation. The following are the projected returns on investment on investments in the various sectors of RES.

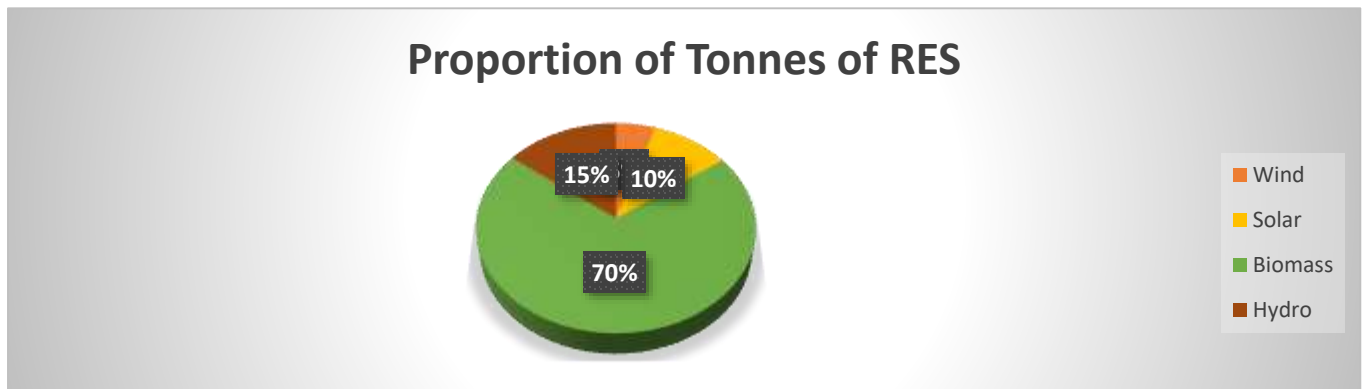
**Table 6. Energy Sources**

RES	Estimated Years for Return in Investment
Solar	3 – 12 years
Biomass	4- 12years
Wind	8 years at least
Hydro power	4 – years
Geo thermal energy	7 – 12 years

Source: Consult Group: Audit and Tax

Biomass energy has the greatest

+potential in as far as RES is concerned as depicted by figure 2. It constitutes 70.5% of renewable energy sources being exploited in Moldova which are currently at at 500,000 tonnes.



**Figure 2: Tonnes of RES**

**Table 7. Estimates on Required Investments and Fuel Substitutes for RES**

Energy Type	Hydro	Wind	Solar	Biomass	Biogas	Biofuel	Total
Annual production	315.4 GW	88.5 GWH	63000 KW	300,000 toe	3700,000 m <sup>3</sup>	52,5000 tons	n/a
Investment (million Euros)	66	26	169	15	3.5	0.35	279.85
Energy Substitution ('000 toe)	71.3	20	42	300	2.0	50	485.3
Cost substitution (million euros)	17.8	4.4	0.94	75	0.5	12.5	111.14
Co2 emission reduction ('000 tons)	1071.75	80	211.5	570	2.65	165	1071.75

Source: Schmeider

RES has the potential of 590ktoe which represents 25% of annual gross domestic energy consumption and this level of production can be achieved by 2020 with sufficient investment in the sector.

### **Security and Independence**

RES represent the first initiative in freeing the republic of Moldova from too much dependence on Ukraine and Russia for its energy sources. Improving energy efficiency in Moldova, which loses up to 25% of its current imported energy, the two options combined would reduce dependence on foreign sources by up to 50% in the next 10 to twenty years.

### **Efficiency Analysis**

Investing in RES would be more efficient in the long run because of the higher substitution costs for current energy sources. As outlines in table 7. above, a total on biomass and bio fuel have the greatest potential in reduction of energy cost. An investment of 15.35 million euros will yield in an annual cost substitution of 87.5 million euros. This would be significant in reducing the energy debt that Moldova owes. It would also offer some relief from the current energy prices which are subsidized for poor families and are therefore not currently trading at market value. This raises questions of sustainability for the imported energy.

### **Sustainability and Environmental Issues**

RES are renewable and therefore sustainable. Currently the areas with the highest potential are biomass, which the country produces every year because of its large agriculture industry which makes 43% of its GDP and is an energy source where production is likely to continue and technologies are more likely to improve due to the pressure from climate change to use more sustainable resources. Investment in RES has a return on investment ranging from 2 – 12 years depending on the nature of the investment making it a more sustainable resource than the imported energy whose market price is below that being charged to consumers that increasing the already high energy debt.

### **Access and price**

Data on current prices to consumers for RES is not available. This is because most of the installations have taken place in public buildings such as schools and health centers and factories where it is not possible to determine the price per consumer. Data shows that 91% of rural households are already using some form of biomass energy for space heating and cooking. It is expected that such heating is of no additional cost to the rural population who have already installed the necessary technology to be able to use this type of heating. However, there are organizations such as MOSEFF and EBDRA that are providing loans to the industrial sector to improve energy efficiency and to install technology for biomass production. Available data has however shown that there is very little elasticity in energy demand for both urban and rural areas. Apart from solar energy whose investment cost is but a fraction of the energy costs that it will substitute, other RES are expected to have a lower price than current sources of energy in the medium to long term.

**OPTION GRADING TABLE:**

On ground of the above option per option analysis and by use of the grading method detailed in the introductory part of this paper, this is the grading table we produced to allow convenient comparison among various options:

**Table 8: Summary of Options**

	<b>Option 1 Status quo</b>	<b>Option 2 Pro-EU</b>	<b>Option 3 Pro-Russia</b>	<b>Option 4 Renewable</b>
Security/Independence	5	12	7	15
Efficiency	7	10	14	12
Sustainability/Environmental	10	12	8	17
Access and price	6	8	19	11
Political feasibility	19	10	5	15
<b>Total (on 100)</b>	<b>47</b>	<b>52</b>	<b>53</b>	<b>70</b>

As stated earlier, we have deliberately assigned equal weights to all the evaluation and measurement categories considered. However, this table is designed to allow policy makers elect to assign different coefficients to each of those various criteria graded in order to reflect specific policy priorities and preferences. Such weighting option is convenient to produce and will yield results equally convenient to read and compare.

Having given such liberty and wide range of decision-making supporting combination, we will conclude our own evaluation basing on the ‘equal value per category’ approach we adopted in our grading system.

**CONCLUSION**

Even though our policy analysis lacks precise future costing for each option, but it is simple to know that Moldova is in a cross road and needs very urgent and firm decision on the road it want to take as a country. Moldova should also realize that any decision taken today will have a generational effect in it political economy. Whereas it is very important for the country of seek further opportunities behind its current focus, it should also because the moves it makes as every decision will have a short and long run implications. At the same time, a careful, well-negotiated

**Recommendations**

Referring to the current economic satiation in Moldova, the country will find it very difficult to maintain the status quo with Russia. Despite Moldova’s 5% economic growth and GDP of 7 billion USD, Moldova is still considered to be one of the poorest countries in the region, and one factor responsible for this is its current energy drive. Consequently, to the circumstances with the EU option, we recommend the following:

Looking at all the options from our investigation, it is conspectus that an immediate European option move will be economically and politically catastrophic for Moldova, especially when the dispensation with other

regional allies, especially Ukraine is unpredictable. Russia has threatened serious action should Moldova attempts any European integration. Though Moldova is considered an independent state, its 100% energy dependency on Russia will not be resolved in the short run. From all indications, it will take more than four years for Moldova to seriously penetrate the European energy options. This basically has to do with not only the capital outlay requirement, but the institutionalization of European Union directives and standards can also be very time consuming. Taking into consideration the various actors within the EU complex decision making process, delays in decisions will obviously have a serious problem on Moldova's short run energy integration plans.

That Moldova continue to negotiate the deal with Russia which will reduce the prices of Moldova's gas supply by 436% and provide access to increase economic ties and other energy alternatives. Russian's promise to improve supply system and strengthen dimensional management system with Russia can give Moldova a firm grip on energy resource consolidation in both the short and medium term.

Because of the fragile confidence Moldova has on Russia especially with past incidence where negotiations and agreements have been sidelined. The threat of Russia turning out Gas supply line and the monopoly Russia has in the determination of prices has created a satiation where Moldova should continue to solicit other options for energy and economic integration, especially with the EU and Turkey. However, we recommend that this be a long run option for Moldova. While Moldova stabilizing gas prices with Russia, the country should also be relaxing its dependency on Russia by making continuous adjustments into its legal system and open up trade with Europe. During this period in time, Moldova can set a reserve fund that will enable the government to pursue the Romania Pipe lines as a long run option. This might sound very political, but with very good diplomatic representation from the Moldova side, they can be able to better position themselves for a sustainable energy option in the long run.

Taking into consideration the fact that Moldova has a huge potential in alternative energy sources like, Solar, Biomass, Hydro, Electricity etc., with Biomass providing about 59% of the present heating energy for Moldova, and an increase in Solar and Wind energy, and with its current commitment to green energy with the United Nations, we recommend that Moldova pays serious attention to the development of every available alternative energy, especially in area that can make the country less vulnerable on Russia's energy. This will in the long run strengthen Moldova energy production capacity and enhance the government to negotiate lesser prices with Russia in the long run.

and having less economic implications in present policy options can strengthen its economic base for a major more diverse move in the long run.

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