Risk Management In The Romanian Energy Sector In An Increasingly Uncertain European Context

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Abstract: *OIn the current European context, the development of the renewable energy sector stays under the sign of the subsidies from the state. The renewable energy sector is developing fast, but needs subsidies to be competitive. The renewable technology is not mature enough and cannot compete with the classic power plants technology based on fossil fuel. The European energy sector is in a process of restructuring aiming to a carbon free and clean energy. The energy transition aims to reduce the greenhouse emission in order to limit the global warming to maximum 2°C until 2030.*

As part of the European Union, Romania has a role in the battle with decarbonazition and has to participate to the reduction of greenhouse emissions by contributing at the European Energy Union common targets.

The management process has to be developed by the government. The state policy implementation involves a laborious undertaking planning objectives in the context of available technologies and energy market competition accentuation.

Keywords*:* state policy, energy security, energy union, renewable energy, greenhouse emission, energy security risks, green certificate scheme.

JEL Classification: Q21, Q28, Q54, M38

1. Introduction

The Energy Union and Climate is one of the ten priorities of the European Commission and its aims to make a more secure, affordable and sustainable energy [1] . The European Energy Union ensures that Europe has a climate-friendly energy. The Energy Union is about the supply diversification and connections, as well as about being a driver to the economy modernisation and investing in jobs and growth for the benefits of businesses and citizens, while fighting against climate changes [2].

The EU's (European Union) Energy Union strategy is made up of five closely related and mutually reinforcing dimensions [3, 4]: , :

1. Energy security, solidarity and trust dimension targets the diversification of energy sources, suppliers and routes, making a better and a more efficient use of the energy produced within the EU. Also, a better cooperation among Member States helps Europe to have a stronger role in the global energy markets [5, 20].

2. A fully integrated internal energy market aims that energy should flow freely across the EU, without any technical or regulatory barriers, through interconnections. In this way the energy suppliers can freely compete and provide the best energy prices. A fully integrated internal energy market can be achieved by connecting markets and upgrading their software [6].

3. Improved energy efficiency aims at securing energy supply by moderating energy demand. Consuming less energy in order to reduce pollution and preserve domestic energy sources will reduce the EU's need for energy imports. The energy efficiency measures are successfully applied in the buildings and transport sectors. In order to meet 2030 targets, energy efficiency is sustained by directives and different programs such as Energy Efficiency Directive, EPBD, Energy Labelling & Ecodesign, Strengthened financial instruments, Heating and Cooling.

4. Decarbonisation of the economy is made by renewing the EU-ETS (Emissions Trading System), leading to a global deal for climate change and encouraging private investments in new infrastructure and technologies. This are the most important steps. Regarding this aim, the EU must become the global hub for developing the next-generation renewable energie tenologies [7].

5. Research, innovation and competitiveness dimension is focused on renewable energy and energy storage and in supporting breakthroughs in low-carbon technologies by coordinating research and helping to finance projects in partnership with the private sector which are main drivers of the European energy market competitiveness [20].

In order to maintain a global leadership Europe needs to focus on becoming the world leader in RES (renewable energy sources) and energy storage, empowering consumers, having efficient energy systems, sustainable transport systems and additional priorities like CCS (Carbon Capture and Storage) and safe nuclear energy.

The new electricity market design foundation of 2030 framework Europe is going to move from today's 16% (27.5% of its electricity requirements coming from RES) to at least 27% renewables share (around 50% of RES produced electricity). This new electricity market design should use the least cost concept by removing the remaining obstacles to better integrate renewables into the internal market [4].

In February 2015, the Commission adopted "A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy". This strategy created a new opportunity to bring in discussion the transition to a low-carbon, secure and competitive economy and to deliver one of the ten priorities of the Juncker Commission [8] .

2. European energy targets

As regarding climate changes, the long term goal agreed to limit the global average temperature increase to below 2°C compared to pre-industrial levels, which guides the EU's climate action. In line with scientific findings reported by the International Panel on Climate Change (IPCC) in the fourth Assessment Report, the European Council stated in 2009 that the EU's objective, in the context of necessary reductions by developed countries as a group, is to reduce GHG emissions by 80-95% in 2050 compared to 1990. The European Council also endorsed the objective to ensure that global emissions reach a peak by 2020 and are reduced by at least 50% compared to 1990 in order to increase the chances of avoiding climate change [9].

The European Commission proposes new rules for consumer centred on clean energy transition. [10]

Many times, the European Council has encouraged the Commission to review and develop legislation for renewables to underpin the agreed 2030 target. The European Parliament has also called upon the Commission to present the renewable energy legislation and to increase even further the ambition level to at least 30%. [14]

"A policy framework for climate and energy in the period from 2020 to 2030" and "the Renewable energy progress report" documents, favoured a binding Union 2030 target of at least 30% of total final energy consumption from renewable energy sources, stressing that that target should be implemented by means of individual national targets taking into account the individual situation and potential of each Member State [14].

The Energy Union Members should lead the clean energy transition, not only adapt to it. This is the reason why the EU has committed to cut CO2 emissions by at least 40% by 2030 while modernising the EU's economy and delivering on jobs and growth for all European citizens. The proposals have three main goals: putting energy efficiency first, achieving global leadership in renewable energies and providing a fair deal for consumers. The consumers are active and central players on the energy markets. Consumers across the EU will have a better choice of supply and access to reliable energy prices and the possibility to produce and sell their own electricity (prosumers) [10]. [

„The 2016-2017 winter package will boost the clean energy transition by modernising our economy" [11][ ].The Commission's "Clean Energy for All Europeans" proposals are designed to show that the clean energy transition is the growth sector of the future [10].

The package of measures will keep the European Union competitive as the clean energy transition is changing the global energy markets.

A 30% energy efficiency target, efficient buildings, clarified ecodesign framework and measures, smarter finance will help Europe grow while meeting its climate goals easier. The proposal for an EU level binding target of at least 30% by 2030 will reduce the EU's fossil fuel import bill.[12].

Renewable electricity, cleaner heating and cooling, decarbonised transport, empowered consumers and at least 27% renewables in the EU will bring clean energy. Renewables are at the centre of this package. The transformation of global power markets is ongoing. According to the IEA (International Energy Agency), renewable energy surpassed coal as main source of power capacity in 2015. In 2030, half of the EU's electricity generation will come from renewables. By 2050 our electricity should be completely carbon-free. Renewables will play a major role in the transition to a clean energy system. Europe wants to reach a share of at least 27% renewables in the final energy consumption by 2030. It has spearheaded global efforts to fight climate change, and has been leading global efforts with a commitment to cut emissions by at least 40% by 2030. It has successfully turned solar and onshore wind technologies from niche technologies into central players in the European power sector. This has also helped global access to cheaper and clean technology. The Renewable Energy Directive, together with the proposals on the New Electricity Market Design the investor are lead to a level of certainty and to a level playing field for all technologies without jeopardising our climate and energy targets by design and governance and a set a regulatory framework [14].

In order to better accommodate the rising share of renewables, wholesale markets have to further develop and in particular provide adequate rules allowing shorter term trading to reflect the necessities of variable generation. Renewables producers will be able to earn revenues from the market, including system service markets that are required to maintain grid stability and security. By introducing trading closer to the time of delivery well-integrated short-term electricity markets will also reward flexibility in the market both for generation, demand or storage [14].

Renewable energy will be increasingly market-based, untapped potential needs to be exploited, and certainty and visibility for investors ensured. New rules will allow renewable electricity generators to earn increasing shares of their revenues from the market. The clean energy package will also guide the design for national support by setting out framework principles to facilitate a cost-effective, market-oriented and Europeanised approach. These principles include cross border opening of support schemes, non-retroactivity and long term visibility for the support. [14]

The Commission's proposals sets a regulatory framework that allows a level playing field for all technologies without jeopardising the European climate and energy targets. The new regulatory framework will make sure that renewables can participate fully in the electricity market, but also that the market related provisions do not discriminate against renewables. Priority dispatch will remain in place for existing renewable installations, small-scale renewable installation and, projects demonstrating innovative technologies. Other installations, independent from the technology applied, will be subject to non-discriminatory third-party access rules. In addition, curtailment of renewables should be done last. [14]

To ensure that the Energy Union Strategy objectives across all five dimensions, and in particular the 2030 energy and climate targets are met, a robust Energy Union Governance is needed. A partnership is put

in place with Member States to monitor the progress towards the 2030 target [14].

This governance system leads to a process of regular surveillance in which the Commission assesses the National Energy and Climate Plans to be developed by Member States. In case the Commission detects that there are gaps in particular as regards renewables and energy efficiency, it can propose the necessary measures to avoid and fill any such emerging gap [14].

Consumers are the drivers of energy transition and with the help of the new technologies like smart grids, smart homes, increasingly competitive roof-top solar panels and battery storage solutions make it possible for energy consumers to become active players on the market [13].

The Renewables Directive will enable consumers to self-consume renewable energy without facing undue restrictions, and ensure that they are remunerated for the net energy they inject into the grid [13].

3. Energy security risk

Energy security is defined in the Green Paper as the "uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial)". Energy supply can be named „secure" if it is adequate, affordable and reliable [15].

Whether availability and distribution of resources, variability and reliability of energy supply are two main lines that are relevant to energy security for current systems or for the planning of future renewable energy systems. The access to a stable energy supply is a major political concern and a technical and economic challenge facing both developed and developing countries, since prolonged disruptions would create serious economic and basic functionality problems for most societies [16].

Energy security risks can be divided into [15]:

a) Energy market instabilities caused by unforeseen changes in geopolitical or other external factors, or compounded by fossil fuel resource concentration;

b) Technical failures such as power "outages" (blackouts and brownouts) caused by grid or generation plant malfunction;

c) Physical security threats such as terrorists, sabotage, theft or piracy, as well as natural disasters (earthquakes, hurricanes, volcanic eruptions, the effects of climate change etc.).

The impact and perception of energy security risks differ across teh UE Member States.

In order to prevent significant impacts from energy insecurity, the governments should diversify their energy sources.

In the long run, the potential for fossil fuel lack and decreasing quality of fossil reserves represents an important reason for a transition to a sustainable worldwide renewable energy system [16].

Renewable energy can contribute to the security of supply of all these energy forms and in addition reduce greenhouse gas (GHG) emissions when displacing fossil fuels. This makes it all the more important to pursue policies for research, development and deployment that can progressively reduce the costs of renewables so that, with appropriate credit for carbon saving, they can be established as technologies of choice.

A critical component of energy security in the short term, is the limited availability

and distribution of resources. Being equal, the more reliant an energy system is on a single energy source, the more susceptible the energy system is to serious disruptions. Examples include disruptions to oil supply, unexpectedly large and widespread periods of low wind or solar insolation (e.g., due to weather), or the emergence of unintended consequences of any supply source [16]. Extremely cold weather is likely to have an impact on the fuel supply of solids and/or natural gas power generating facilities. Imports play a critical role in the success of the Romanian electric power system to handle this situation, but this represents a potential source of energy insecurity for both developing and industrialized countries [16].

The implications of renewables for energy supply security differ between the electricity, heat and transport sectors [15].

For electricity, introducing a large portfolio of renewable energy sourses, like hydro, geothermal, bioenergy, solar and wind energy generating plants into the system and establishing a decentralised power generation system can provide more security [15].

The geopolitical security risks are reduced using RES by contributing to fuel mix diversification.

Their risks of RES are different from those of fossil fuel supply risks. Biomass can be an exception although imported bioenergy feedstocks usually diversify import portfolios.

The big advantage of renewables is that they can address environmental as well as security objectives [15].

Energy efficiency improvements through demand side management and technological innovation can cost-effectively mitigate the large-scale impact of energy supply disruptions in the electricity and heat sectors, and to a limited degree in the transport sector too. Demand side management and energy efficiency measures can reduce dependence on conventional fuels for the production of electricity, heat and transport fuels [15].

Renewable energy can also make a contribution to increasing the reliability of energy services, in particular in remote and rural areas that often suffer from insufficient grid access [16].

Also, economic development has been strongly correlated with increasing energy use and growth of greenhouse gas emissions. Renewable energy and energy efficiency help decouple the GDP from the energgy consumption, contributing to sustainable development.

"Access to modern energy services, whether from renewable or nonrenewable sources, is closely correlated with measures of development, particularly for those countries at earlier development stages [16].

Countries at different levels of development have different incentives and socio-economic sustainable development goals to advance renewable energy. The creation of employment opportunities and actively promoting structural change in the economy are seen, especially in industrialized countries, as goals that support the promotion of renewable energy" [16].

4. Romanian renewable energy sector

The growth of renewable energy sources has come in correlation with the onset of substantial government support schemes which began in the 1990s and have increased at an accelerated pace over the 2000s and 2010s. The growing prices for conventional energy

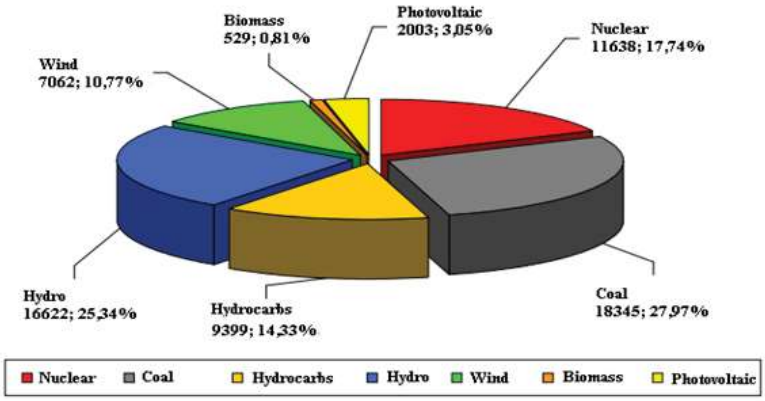
together with the steady price decrease for renewable technologies contributed to an investment boom in RES of about 1 trillion dollars globally. But renewable energy has considerable associated costs and difficulties.

Wind farms, solar parks, and other kinds of RES were developed insofar as they could rely on support schemes. The tehnologies have not yet reached the stage of economic maturity to withstand market forces by themselves. Second, RES produce sizeable quantities of electricity, but mostly in a discontinuous manner; neither wind nor sunlight generate the kind of continuous and predictable power that hydrocarbon fired or nuclear power plants do.

Romania has rich resources and diverse renewable energy distributed throughout the country.

They will be exploited more widely as performance-price ratio of the technologies will improve the maturation of new generations of equipment and facilities related. The electricity mix of Romania is and will be balanced and diversified, as you can see in the below figure [17].

Gross production structure in 2015
Total production – 65598 GWh



Source: Annual report of TRANSELECTRICA SA -2015

Now, the Romanian renewable energy sector is supported by the green certificate scheme which has been operating since November 2011. In principle, it awards green certificates (GC) to accredited plants using RES for each MWh of generation from RES for a period of up to 15 years from first generation under the scheme. The number of certificates awarded varies depending on technology. GCs trading value is limited by the law at a price within a maximum and minimum range in order to protect both investors and consumers. Suppliers redeem the certificates to discharge a quota obligation based on their share of total sales. Green certificates trading is done on the domestic market of green certificates and is independent of electricity trading. The cost of the scheme is therefore borne by electricity consumers through increased price of electricity.

Electricity from RES is taken primarily on the electricity market [17].

Demand for green certificates is a function of the quota and the demand for electricity. The latter is driven by consumer wealth and so can be forecasted, based on projections of GDP, adjusted for electricity intensity, which falls as GDP increases.

This support mechanism resulted in a few years in the sharp rise in investment in new capacity for the production of renewable energy. Given that short-term impact of uncontrolled increase of electricity bills due to the contribution to promoting renewable energy affordability raises both the households and consumer industrial, promotion system has undergone several changes [17].

Given the effect of uncontrolled growth of energy prices to final customers, the initial scheme has undergone several changes in order to reduce costs [18]. The wind, solar and hydro plants which optained accreditation after December 2013 have received less green certificates for the energy produced in order to avoid the risk of overcompensation. This led to a decrease in RES technology costs to prevent that new plants to do not receive a return on capital in excess [18].

From November 2013 to March 2017 a number of green certificates was temporarily postpone. The share of GC deferres according to the technology form as follows:

- 1 GC per MWh for new hydro plant up to 10 MW in capacity
- 1 GC per MWh for wind power plants
- 2 GCs per MWh for solar power plants

This measure lead to a diminished potential of oversupply certificates, but would have affected the cash flow of investments compared to expectation at the time of investment, reducing the discounted return on capital. The resulting projected breakdown of GC by category for 2016 is shown in table below. Because of the limited period of validity, unsold GCs will expire at various points during 2017. It is possible that some of the GCs unsold in 2016 will find a buyer before expiring [18].

Forecast flow of 2016 GCs

	Wind	Solar	Biomass	Hydro
GCs awarded	11,357,783	10,061,337	2,128,281	2,254,691
GCs deferred	8,821,560			
GCs redeemed	12,566,051			
GCs expired (2017)	4,414,480			

Source: ECA

The cost of support to suppliers from 2014 was diminished, compared to earlier expectations, by reduction the quota for suppliers.

The reduction in obligation for energy intensive users essentially transferred the cost obligation towards other consumers.

These changes have led to imbalances in the functioning of the support scheme and lack of predictability for future investors.

The access to the current support scheme by green certificates is though coming to an end as of December 31st, 2016.

Romania is aimed at further attracting investment in RES, capitalizing the high natural potential, respectively in the related industry of energy transition [17].

5. Conclusions

The management process has to be developed by the government. The state policy implementation involves a laborious undertaking planning objectives in the context of available technologies and energy market competition accentuation.

Romania participates in an extensive process of integration of energy markets in the EU, with the effect of a more open competition between Member States' national actors. This raises the question of competitiveness in electricity and ancillary services in Romania in a regional context, the impact on cross-border flows and profitability generating capacity holders.

By developing strategies, policy-making and regulatory decisions, the state holds powerful levers for steering investment of resources by the mix of electricity in order to meet its strategic objectives and obligations (legislation, treaties and international agreements) [17].

Development and implementation of support schemes for renewable energies requires economic realism, including the evolution of technologies, taking into account international competitiveness of industrial consumers and affordability for households. The objectives targeted by Romania have been met without over-compensating producers, but the lack of stability or a low level of the support schemes may jeopardize the support of an appropriate pace of investment.

„The GC scheme began with a probably over-generous payout to generators, based on expectations of high IRRs, likely compounded by higher wholesale market price expectations. This led to high generator expectations and rapid investment. This inevitably had a cost to be borne by consumers [18].

Subsequent policy adjustments to reduce the impact on consumers had the effect of negatively impacting generator cash flows, with an additional adverse effect of many certificates being unsaleable, because demand had reduced faster than supply [18].

In terms of policy measures, this means playing off reasonable expectations of generators against reasonable cost expectations of consumers. The negative cash flows faced by generators generally in recent years (which is unevenly split with some generators facing a disportionate share of unsold GCs and so a much worse income than others) will almost certainly have to be alleviated to the extent that policy changes against their reasonable expectations were instituted, but this can only be done at the expense of consumers (or taxpayers). [18]

The most likely policy combinations will see improved cash flow for generators, but at a reduced return as compared to initial expectations; for consumers it would be

through delaying payments into later years. Achieving positive but steady cash flows requires a combination of increasing the quota and either forced banking of certificates (through deferred trading of them) or voluntary banking by extending the tradable life of certificates. The "targeted obligation" methodology in combination with extended reinsertion of deferred GCs indicates positive cash flows are just about achieved from 2017 or 2018 for all technology and year-of-accreditation groups with the exception of wind plant accredited in 2014 and 2015 (comprising under 12% of wind capacity). Even this case, however, requires a substantial increase in the impact of the GC scheme as a proportion of consumer bills, peaking at over 11% in 2017, while real MIRRs for many technology-year groups remain under 4.5%" [18].

The key policy issues in the Romanian electricity sector are based on three fundamental strategic objectives: security, affordability and emissions. [19]

The security of supply – both short term and long term, must maintain a balanced, diversified power mix for the foreseeable future and strengthen/ modernise the grid (transmission and distribution), expand interconnection capacity [19].

The affordability – competitive price for industry/ services; affordable price for households. This means a competitive, liquid, efficient power market – based also on functional natural gas market. Also, a gradual decommissioning of the remaining old, inefficient power plants/ CHPs, market-based investments in new capacities, with limited state interference are necessary. Other important aspects to take into account are the careful prioritisation and timing of grid investments, avoiding excessive cost and grid tariffs and predictable and equitable taxation and subsidies in the electricity sector [19].

Emissions – fair contribution to EU GHG targets; limit air, water and soil pollution, while preserving biodiversity like future of RES – gradual expansion of hydro, wind, solar PV and biomass/ biogas, future of nuclear energy – Cernavoda 3 &4 (CANDU 6 technology), extension of lifetime for 1&2, future of natural gas – gradually taking over from coal, balancing friend of RES alongside hydro and future of lignite and sub-bituminous coal – declining competitiveness in regional market (ETS) [19].

Romania is bound in its power sector development by EU commitments and it needs to consider long term electricity scenarios [19].

The issues related to network development are essential in a regional perspective - EU financing for interconnections between all countries in the region in order to ensure security of supply.

Also there are issues related to regional market coupling and integration - Regional market for ancillary services/ balancing, including demand side management [19].

However, it is essential to first ensure a competitive level playing field through environmental compliance – same standards for SOx, NOx, dust, Hg and participation in the ETS market by all countries, with similar, if any, derogations [19].

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