DEVELOPMENT OF RENEWABLE ENERGIES IN A CRITICAL ECONOMY ENVIRONMENT

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ABSTRACT
The theoretical role of the renewable energies is well defined on the energy strategies of the European Union Member States, but the real achievement of the targeted goals is changing due to several issues. Is the beginning of the 21th century the appropriate time to make the transition towards a green energy economy? Is the sound transition driven by economic recovery, or would it be more effective driven by scarcity of fossil fuels? The ever-increasing population of the world and its growing demands on goods influences the strategic thinking of each country. The time period of the phenomenon on comparative country benefits is tending to its end and the value of an independent, self-supporting energy system is increasing. The ownership of the energy sources is becoming one of the political aims and becoming the core of the competitiveness. There are dilemmas on global sustainable development, when the facts show different picture as the expectations. Despite the strongly displayed financial supports on the renewables, fossil fuels get much higher amount of subsidies than the clean energy technologies. The meaning of competitiveness from energy aspects is required.

KEY WORDS: renewable energy, sustainable development, competitiveness

INTRODUCTION
The approach of the energy policies is changing all over the world due to the lack of the conventional types of energy and the impacts on the climate effected by using the fossil fuels. We can discover a transition towards the low carbon or green economy, however in some cases towards the non-conventional fossil fuels based energy supply. One, highly accepted common driver is however the goal of the energy independence by using domestic energies. There are different approaches by choosing the right energy mixes like energy independence, security of supply, cost of the energy, sustainability, climate change – however this latest issue is considered mainly only in the EU countries. One missing, hiding, or not well defined and measured point of these decisions is the competitiveness. The aim of this study to collect the main drivers and trends in the field of energy developments and to point out the importance of the consideration of the environmental and cost externalities and the effects on the competitiveness by choosing the energy mixes.

MATERIAL AND METHODS
The study is based on a secondary data analysis by taking an overview on the current energy consumption data of the world, looking into the scenarios are published on the energy trajectories for the next decades, pointed out the barriers of the ongoing trends in the field of energy and the physically thresholds of our climate. In the second part brings forward a kind of multi-criteria decision analysis in order to emphasis the possibility of the sound energy policy making.

RESULTS AND DISCUSSION

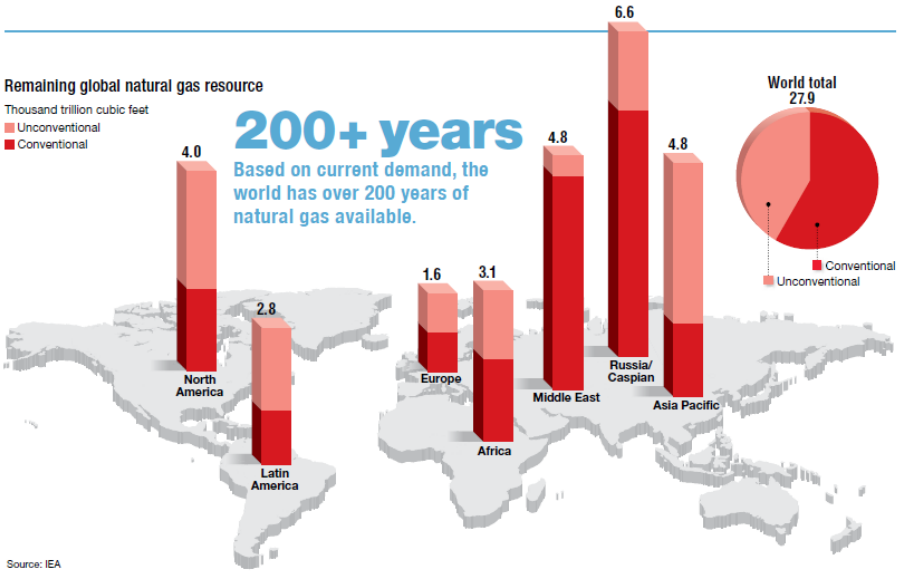
Non-renewable energy sources – for the business as usual case

Despite some analyses are very pessimistic by forecasting the availability of the non-renewable energy sources (Clugston 2010), according to other predictions on the fossil fuel reserves it seems that the world has remarkable stocks of them for the future.

The British Petrol's Outlook writes: "The world has ample proved reserves of oil and natural gas to meet expected future demand growth. At the end of 2011, global proved reserves of oil were sufficient to meet 54 years of current (2011) production; for natural gas that figure is 64 years." (BP 2013) Another notable study empowers the same fact: "The International Energy Agency estimates there is about 28,000 trillion cubic feet (TCF) of remaining natural gas resources across the globe. Experts believe this is enough natural gas to meet current demand levels for more than 200 years." (exxon 41p)" The second mentioned forecast accounts the unconventional gas production as well, mentioning that this kind of gas makes up about 40 % of the estimated remaining resources.

Due to the estimations the US will be nearly self-sufficient in energy by 2030, with a minimal import of oil and remarkable export of gas and coil. Although there are reserves of fossil fuels, the ever-increasing population, it's growing energy demand and the vulnerable climate causes the need to change the existing behaviour of using energy.

1. Table Remaining global natural gas resource, Source: Exxon 2013



Ever increasing population and growing energy demand

The projections say that in 2040 the population of the earth will reach the 9 billion what means dramatically increasing on the need of natural resources. When we are taking into account that 1,3 billion people doesn't have access for electricity in 2013 (IEA)[1], easy to imagine that the former outpointed reserves will be not enough to supply the plus 3 billion people in 30 years, as the mentioned data based on current demand.

Vulnerable climate

Despite strong commitments in the European Union on green investment scenario, the aimed 2 °C limitation of the global warming by 2050 is threatened. According to the International Energy Agency (IEA), the development of the shale-gas businesses can easily cause

[1] WORLD ENERGY OUTLOOK 2012, p 7

increasing CO_2 emissions and a value of global warming by 3,5 °C.[2] „At the same time it is becoming ever clearer that we will exceed the Earth's ability to absorb greenhouse gases (GHGs) long before we run out of fossil fuels" –says a study on the possible effects of shale gas[3].

Energy roadmaps

The Total Primary Energy Supply (TPES) of the World is more than doubled from the 6.107 Mtoe in 1973 to 12.717 Mtoe in 2010. The share of the fossil fuels is quite similar since then, as the share of oil, coal and gas was 86,7% in 1973 and 81,1% in 2010. The future scenarios show that the energy consumption in 2030 will be 61% above the 2011 level, while the share of the fossil fuels remains near 80% until 2040 (~76% in 2030 according to BP[4], ~77% in 2040 according to Exxon[5]. "Despite the growth in lowcarbon sources of energy, fossil fuels remain dominant in the global energy mix" stands in an IEA study[6]. That means that the above mentioned roadmaps count the remaining ~ 20% share as nuclear and renewable energies, ~10% of each.

Urgent need of much more sensible energy policies

The increasing population, their needs for energy and other related consequences like growing pollution and higher global warming, oftener natural disasters, less reserves of clean water[7] are strongly threating the mankind. These issues coupled with the decreasing reserves of non-renewable natural sources warn us to change paradigm and to look for a transition towards a low carbon or green economy.

Barriers to make the transition

The above mentioned transition is not highly welcomed by each of the decision makers. As I pointed out previously, the fossil fuels including the non-conventional fossil fuels will preserve their leading position into the energy mix. The low carbon or clean energies like renewables and nuclear are facing several crucial problems by trying to reach a significant share. "… wind and solar face challenges related to economics and reliability considerations and nuclear faces unique considerations regarding public perceptions of safety. At the same time, new gas-fired generating units use very efficient technologies and are easy to build at a reasonable cost, flexible to operate and supported by abundant gas supplies. As a result, gas is increasingly viewed as the most economical fuel choice for electricity generation for the United States[8]" – holds Exxon Mobil. From the point of view of the electricity grid operators, we can agree, one barrier of the clean technologies is the intermittence or the non-adjusting behaviour of them. When the new gas-fired generation units are declared as the most economical fuel choice for electricity generation, than we need to see the fact, that fossil fuels are subsidised with an increasing amount, $523 billion in 2011 which is six times more than subsidies to renewables[9]. So as the competitiveness of gas firing is in a great part due to

[2] International Energy Agency (IEA), May 2012, 'Golden Rules for a Golden Age of Gas', p.91 (http://www.worldenergyoutlook.org/goldenrules/)

[3] Greig Aitken, Helen Burley, Darek Urbaniak, Antoine Simon, Sarah Wykes, Lisette van Vliet Shale gas Unconventional and unwanted: the case against shale gas, extractive industries: blessing or curse? 2012, http://www.foeeurope.org/sites/default/files/publications/foee_shale_gas_unconventional_and_unwanted_0.pdf

[4] BP Energy Outlook 2013 p10

[5] The Outlook for Energy: A View to 2040 p49 exxonmobil.com/energyoutlook

[6] WORLD ENERGY OUTLOOK 2012, p 1

[7] UNEP, 2011, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers, www.unep.org/greeneconomy p 25-26

[8] (2013 TH E O U T LOOK F O R ENERGY: A V I E W TO 2 0 4 0 exxonmobil.com/energyoutlook p32)

[9] WORLD ENERGY OUTLOOK 2012, p 1

subsidies, we can suppose that with similar supporting measures the intermittence problem could be solved by R&D, searching for competitive battery-technologies and deploying smart grid systems. While the costs of the renewable energy subsidy systems are consumption-linked fees in the electricity bills in several countries[10], the fossil fuel subsidies are "hidden costs", not advertising their real amounts. This fact shows that due to the higher subsidies in the fossil fuels sector, the efforts done on renewables until now are not enough to make a real transition; in a short term and cost-based competition they will lose against the fossil fuels. There are counter-examples as well, and it looks a sound investment. Iceland and Denmark are countries who decided for decades to start the transition towards the renewables and nowadays they reached their goals: energy independence, almost zero emission and environmental impacts, acceptable energy prices, competitiveness and other benefits. Under the pressure of the environmental circumstances the need for an independent ranking of each energy sources is necessary, in order to make the right chooses and to start the transition into the sustainable energy mix.

Looking for a disinterested method

The program named New Energy Externalities Developments for Sustainability (NEEDS) was co-funded by the European Commission within the Sixth Framework Programme (2002-2006) with the goal "to evaluate the full costs and benefits (i.e. direct + external) of energy policies and of future energy systems, both at the level of individual countries and for the enlarged EU as a whole[11]". The methodology for assessing external costs covers the quantification of the externalities, analysed an "impact pathway". The following issues are counted: Airborne pollutants, Biodiversity losses due to land use, Damage costs of greenhouse gas emissions. The power plant types follows as advanced fossil fuels, fuel cells, offshore wind, photovoltaic, concentrating solar thermal power plant, biomass power plant with steam turbine, nuclear power plant, ocean energy, hydrogen. When taking into account the externalities the implications show interesting results. The whole analyses of the applied methods and indicators would be necessary, but by the publication date of the summary report (2009) we were before the Fukushima disaster and before some other technological and market changes, so some crucial weights likely weren't take into account by the ranking.

The external costs were the highest by the hard coal power plants and the lowest by the wind offshore plants. The whole ranking is, started with the highest cost charger: hard coal, biomass small, gas combined cycle, photovoltaic (PV), solar thermal, nuclear and wind offshore. While this values were in the near zero and 3 Euro-Cent per kWh by the external costs, the range is between 45 and 2,5 Euro-Cent per kWh when the study analyses the social costs. Surprisingly, the highest social cost bearer was the PV due to the relatively high investment costs in 2009. Besides this the cheapest electricity producing technology was by the social costs the nuclear power plant. The whole ranking is PV, natural gas fuel cell, solar thermal, biomass, wind offshore, gas combined cycle, lignite, nuclear[12]. However, after the Fukushima disaster and the dramatically, decrease of investment costs for instance by PV (60% off since 2009)[13] the need is evident for recalculation the model. Despite the 3-4 years old data, the methodology looks remarkable.

[10] IEA/IRENA Global Renewable Energy Policies and Measures Database http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=35&CatID=110&SubcatID=158&RefID=158&SubID=170&MenuType=Q

[11] http://www.needs-project.org/index.php?option=com_frontpage&Itemid=1

[12] http://www.needs-project.org/docs/Needs.pdf p8

[13] Bundesverband Solarwirtschaft e.V. (BSW-Solar), September 2012 Statistische Zahlen der deutschen Solarstrombranche (Photovoltaik)

CONCLUSION

The study highlights the barriers of the ongoing trends in the field of energy listed the trajectories regarding the non-renewable energy sources, noticed the ever increasing population and growing energy demand, mentioned the urgent need of much more sensible energy policies, communicated some barriers to make the transition, and showed a disinterested method by making energy policy. The analysis shows that the environmental and social externalities are well understandable and measurable issues. The method warns that the policymakers have possibility to bring decisions on a professional marked and measured basis, and have possibility to take into account not only the short-term interests but all of the ecological, environmental, and social impacts.

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