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Energetikus Európa – A Mediterrán Gyűrű vs. A Kék Gazdaság

**Energetic Europe – The Mediterranean Ring vs. The Blue
Economy**

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“Energy is never the goal in itself, it is always a tool to reach the goal”

(Pauli, 2010, p.197)

Introduction

For the European Union it is high time to face the recent trends such as changing energy demand and energy dependence, increasing prices and threat of dramatic climate change.

Our essay is searching for an answer to the question whether a global or a local energy supply is more favorable for the European Union. The search is based on the comparison of global and local energy supply solutions, through the examples of the Mediterranean Ring as a global top-down and of the Blue Economy as a source of local bottom-up opportunity. We are analyzing the options by the use of futures wheels and scenario building – setting the time frame up to 2050 – in order to discover which matches more the EU’s three main energy goals: competitiveness, security of energy supply and sustainability. We are drawing conclusions that depend on the different key drivers that will dominate in the future.

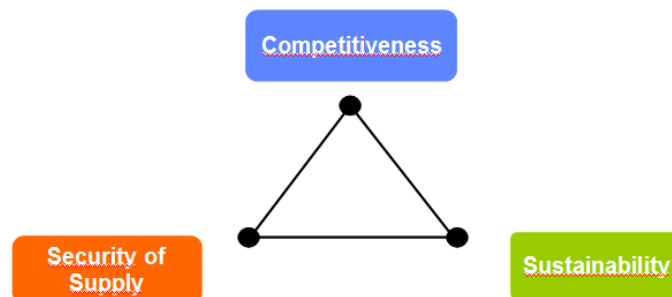
Our essay is structured as follows: first we are taking a look at the relevance of the topic of energy supply in the European Union then we introduce the concept of the Mediterranean Ring and that of the Blue Economy. After that, we analyze both ideas through futures wheels – first separately and then together adding historical forces to the analysis. Partly by the results of the futures wheels we identify the critical uncertainties, which serve as starting points to our scenarios built. By the end of the scenario building we come to a conclusion on the question in focus: a global or a local solution is more favorable to achieve the three main energy goals of competitiveness, security of energy supply and sustainability.

I. Energy and the European Union

The European Union for many years did not emphasize energy policy, but around 2005-2006 it became clear that “Europe is entering a new energy landscape” (European Commission website, 2011a) and that the challenges of the rise of energy dependence (more than 50% in 2006 [European Commission website, 2011a]), more and more expensive energy, needed investments in infrastructure and on the other hand the urging climate change made a

common well-defined energy policy inevitable. At the reunion of European Heads of State and Government at Hampton Court in the late 2005 the necessity of a European Energy Policy was announced. On 8 March 2006 a Green Paper – A European Strategy for Sustainable, Competitive and Secure Energy was published, and since then it is considered as a prior issue (European Commission website, 2011a).

So the European Union is aware of the importance of energy supply, which is not only a source of well-being; it turned out that it is also a source of self-destruction through strongly damaging the environment. That is why when it comes to energy both aspects are taken into consideration by the EU. The EU determines three main energy goals: competitiveness, security of supply and sustainability (Background information for the European Council, 2011). The first two relates to our well-being and the third relates to preserving our environment. (Of course sustainability and preserving the environment have a direct effect on our well-being on the long-term, so they relate to our well-being as well. Still, nowadays with our present way of living our comfort and sustainability seem to oppose.)



1. Figure: EU energy goals. Source: Background information for the European Council (2011) p.14.

Some information to see the relevance of the EU globally: the EU is a “political and economic community with supranational and intergovernmental features” (IEA Energy Policies Review, 2008, p. 17.) composed by twenty-seven countries, which together have about 500 million inhabitants (IEA Energy Policies Review, 2008, p. 17.) and had a GDP (PPP) estimated around \$14.9 trillion in 2010 (CIA website, 2011), which makes it the first followed by the United States and China in the ranking of Central Intelligence Agency (CIA website, 2011). However according to future demographic and economic trends Europe will present less than 7% of the world population, 15% of the world GDP and 12% of the world energy consumption by 2050, while it presented 10% , 25% and 20% respectively in 2006 (World Energy Technology Outlook – 2050, 2006).

In the light of these trends it is understandable that the energy challenge – as a key source of a prospering economy – remains a priority for the EU. One of the main weaknesses is the fact that the EU is highly dependent on energy imports (mainly on oil and gas imports, total reliance equals more than 50% today [Background information for the European Council, 2011]), reaching 64% in 2020 and 67% in 2030 according to business as usual (BAU) projections (IEA Energy Policies Review, 2008). To strengthen the EU energy market a fully functioning, interconnected and integrated internal energy market, a modernized and expanded energy infrastructure (to interconnect networks across borders), investments in energy efficiency, implementation of the Renewable Energy Directive, investments in renewables and safe and sustainable low carbon technologies, consistency and coherence in the EU's external relations, diversified sources of supply, strategic corridors for the transport of large volumes of gas (such as the Southern Corridor), reliable, transparent and rules-based partnership with Russia and at last but not at least the elaboration of a low carbon 2050 strategy are needed – according to the conclusions on energy made by the European Council, 4 February 2011 (Conclusions on Energy – European Council, 2011).

Another clearly articulated ambitious energy and climate change objective of the EU adopted by the European Council in 2007 is to reach the '20-20-20% by 2020 goals' (Energy 2020, 2011), which are about reducing greenhouse gas levels by 20%, increasing the share of renewables to 20% and reducing energy consumption by 20% by the year 2020. Concrete projects supported by the EU are the following: connection to offshore wind power in Northern Europe (North Sea – Baltic Sea), Desertec project (solar thermal power (CSP) plants in North-Africa [Desertec Foundation website, 2011]), 10% of fuels should be bio by 2020, building LNG (Liquefied natural gas) terminals, and network developments (at the Nordic sea, Mediterranean Ring, Nabucco) (Kacsó, 2011).

After taking a short look at the EU's projects, directives on energy, it is clear that nor the Mediterranean Ring, nor the concept of Blue Economy are among the EU's main plans. Mediterranean Ring is at least mentioned (Energy 2020, 2011), but Blue Economy is beyond the EU's perspective. It is going to be us, who try to evaluate the above mentioned so far neglected programs if they could serve as solutions to achieve competitiveness, secure energy supply and sustainability in the EU. First we introduce the two concepts shortly, then we analyze them in more detail with the help of some futures studies' methods (futures wheels and scenario building).

II. The Mediterranean Ring

An endeavor of the European Union is to start investments that help the energy efficiency, the energy savings as well as the diversification of the Union's external energy supply. Basically, it includes the establishment of far-flung renewable energy producing projects that reduce the emission of greenhouse gases. Therefore, these projects are concentrated on the usage of wind and solar energy.

The Mediterranean Ring is yet a plan to connect the electricity and gas-main networks of the Southern-Mediterranean areas with the European networks because of the great solar potential these areas have. To these territories 630 thousand terawatt/hour solar energy comes annually. To be able to understand this "great solar potential", it is worth to say that six-thousandths of that amount is enough to satisfy the electricity demand of Europe (Origo website, 2009). The goals are getting higher and more ambitious, the latest information is about to deploy 175 000 megawatt in the Mediterranean countries (Kacsó, 2011). Just to mention some, the Mediterranean Ring would concern Syria, Algeria and Libya too.

For the development three main steps are needed to be made. First of all, a union-wide agreement is needed on the importance of network developments from an energy security aspect. Then, the exact detailed steps together with the financial resources are needed to be identified. Finally, all the needed instructions should be executed.

The technological background contains mature, wide-spread methods. There would be both terrestrial and other units across the sea in the form of direct current (DC) cables. These high voltage DC cables are able to transfer the electricity even to North-Europe with only 10-15% loss (in Hungary 10% of the produced electricity is lost) (Origo website, 2009).

Three types of solar power plants are taken into consideration as technological solutions: a photoelectric power plant (directly producing electricity with inbuilt silicon chips), a tubular solar system (the focused solar energy heats a salt liquid that cause steam to produce alternate current) or a tower solution (on the top of a tower there is a boiler in the focus of circle-placed mirrors producing alternate current with the help of steam). The development of the Mediterranean Ring also includes the development of defense, energy-coordinating, telecommunication and other systems by which a new market segment opens for the investors (Kacsó, 2011).

For the financing of the project the EU considers the cooperation of the European Investment Bank and European Bank for Reconstruction and Development very important.

Possible further financial resources can be PPP constructions, national contributions by the member states or financial guarantees (Kacsó, 2011).

What the whole project would mean in terms of money is difficult to predict. According to some current guesses, North-Africa will be capable of supplying 15% of the European electricity demand by the year 2050 from an investment of 555 Milliárd USD (Gigaom website, 2009). The Desertec Industrial Initiative (the most expensive electricity project of the world containing 17 companies) plan to finance its program from 400 Milliárd EUR for forty years (Világgazdaság website, 2010). Therefore, to start investments like the Desertec or in our case the Mediterranean Ring takes a huge amount of money but on a long-term it can be rewarding from many aspects which we will analyze later on.

This is a green solution which means that its usage is less harmful to the environment than any other alternatives, in this case fossil. After such an investment, the research and development sector would flourish at this field of this technology. The demand for solar cells would also increase, causing a decrease in their price (Origo website, 2009).

But the term in the common knowledge does not perfectly emphasize the drawbacks. The implementation costs a lot which would force the European Community to withdraw the financial resource from the support of other projects. In addition to that, it can have an environmental impact, although not as big as a nuclear power plant. It would be located in a natural habitat –a desert, which also needs protection. Besides, the demand for electricity at night should be fulfilled from alternative sources (Kacsó, 2011).

Now that the concept of the Mediterranean Ring is highlighted, we would like to introduce the other pillar of our essay, The Blue Economy.

III. The Blue Economy

Blue Economy is a “new way of designing business” (The Blue Economy website, 2011a) and a new way of thinking about the interrelations of economy and environment initiated by Gunter Pauli. The main concept is to watch carefully how nature works and try to imitate the efficiency and pureness that evolved through millions of years, through evolution of species and ecosystems on our planet. The Blue Economy collects innovations that provide practical solutions based on sustainable natural systems, where the term waste doesn’t even

exist, as the output of one process or product serves as input to another one. No waste means less pollution threatening ecosystems. To be more convincing, it is stated that industries and economies also benefit from the implementation of Blue Economy innovations by bringing greater competitiveness and efficiency, productivity, new industries and new jobs generated, thus new cash flows, rising income and social capital. Within 10 years 100 innovations and 100 million jobs are predicted if acting upon the Blue Economy. A number of leading scientists from various countries in the world are working on pioneering researches to develop natural ecosystem-inspired innovations. Blue Economy is a way to fulfill our desire to do more with what we have (The Blue Economy website, 2011b).

To get a deeper insight about Blue Economy there are some statements and principles to take a look at. First of all, “nature constantly increases its efficiency and has proven to be the most economic actor of our planet” (The Blue Economy website, 2011c), meaning that ecosystems are reaching maximum efficiency and maximum sustainable sizes of populations by constantly adapting to conditions and preserving sustainable processes and dropping unsustainable ones. (That is what we call evolution.) Secondly, for most of us, it is clear that “human production and consumption patterns are no longer sustainable” (The Blue Economy website, 2011c); we passed the planets carrying capacity which puts our own lives and future into serious danger. The solution offered by the concept of Blue Economy is to think in systems and cycles, and to become metabolists to see how the third industrial revolution evolves (The Blue Economy website, 2011c), in other words to shift from a system where the good is expensive, and the bad is cheap, to a system where the good and innovative is affordable (The Blue Economy website, 2011a).

The principles underpinning the Blue Economy concept are numerous. Firstly, solutions advised by Blue Economy are based on physics, such factors as pressure and temperature. Another principle is to “substitute something with Nothing” (The Blue Economy website, 2011d), so to find the unnecessary resources to production and drop them. Thirdly, natural systems cascade nutrients, matter and energy so none of the by-products are waste, but they are sources for a new product. Blue economy opposes to industrial standardization according to the analogy that nature reached rich biodiversity and that wealth means diversity. Similar to this is the statement that monopolization and nature are contradictory and that nature always provides opportunities to entrepreneurs (The Blue Economy, 2011d).

The imaginative saying: the only constant is change holds for nature too, providing continuous chances to innovate. About natural phenomena, gravity is regarded as main source of energy (solar energy is the second renewable fuel), and water is regarded as primary

solvent. Just as nature, economy should also take advantage of locally available resources with respect to culture and traditions. In nature abundance is reached after responding to basic needs, whereas the basis of production of today is scarcity. Natural systems are non-linear, where everything is connected, risk is shared, and multiple benefits are generated. Everything is biodegradable in nature, and water, air, and soil are the commons, free and abundant. Nature is efficient, searching for the optimum, converting negatives into positives and searching for economies of scope (one innovation benefits all) (The Blue Economy, 2011d).

“The Blue Economy” book developed and written by Gunter Pauli (entrepreneur, who founded Zero Emission Research Initiative) contains 100 innovations and it was presented as a Report to the Club of Rome in 2009. Some (around one third) of the 100 innovations has already been implemented, another part (one third) is in prototyping status and the rest has been scientifically proven but are not yet market-ready products (The Blue Economy website, 2011a).

Blue Economy clearly distinguishes itself from green economy by deliberately choosing another color. The reason behind the differentiation is that beyond the common aim to reach sustainability the two (blue and green economy) are not the same. Green economy is eco-friendly, but stays within the prevailing economical business models and the result (according to criticism by Blue Economy) is that only a few of us can afford expensive green products, which are sometimes not even environment friendly at the end, and that what is unhealthy and unsustainable is cheap, thus consumed by the majority of the population. On the other hand Blue Economy requires a new economical business- and macro model, and brings a brand new paradigm in economy. The new concept can give hope to people who trusted green economy and were disappointed not to give up by supporting Blue Economy.

To sum up the essentials: “Respond to basic needs with what you have, introducing innovations inspired by nature, generating multiple benefits, including jobs and social capital, offering more with less: This is the Blue Economy” (The Blue Economy, 2011d).

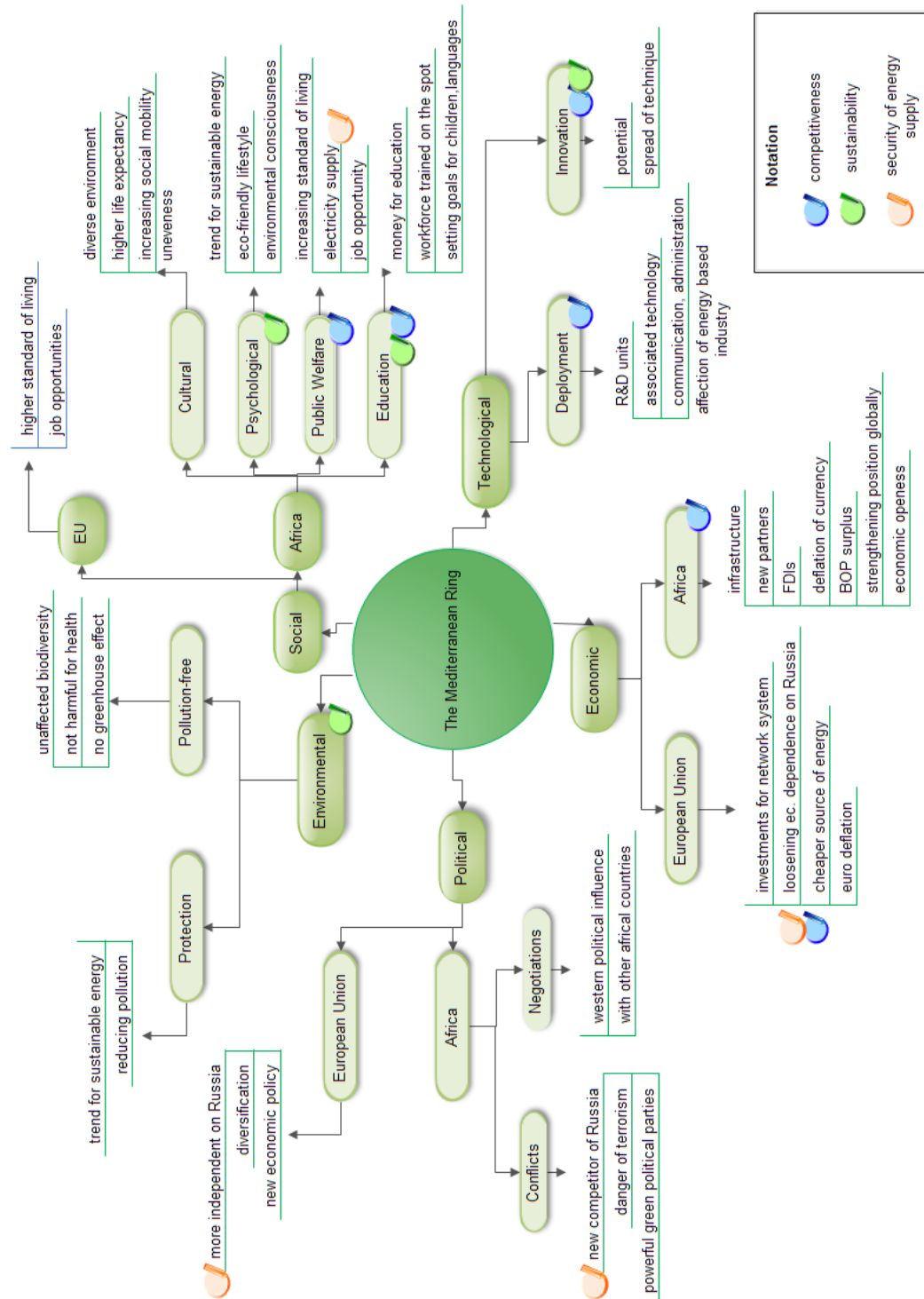
Taking a look at Blue Economy as a whole, the question arises: what does it offer as energy supply solutions. Can it fulfill the EU’s energy goals: competitiveness, security of energy supply and sustainability? It is clear that this concept has no one best source of energy, which should be used whatever the need of energy may be. That is a great difference between the two concepts. Our ideas of energy sources so far are based on using an energy source (e.g. fossil energy resources, solar energy, wind etc.) for any kind of purposes, while the approach of Blue Economy states that “energy is never the goal in itself, it is always a tool to reach the goal” (Gunter Pauli, 2010, p. 197.). In other words, while the traditional business as usual

approach is seeking to find energy in the first place and is then distributing it among energy consuming activities, the Blue Economy attitude is about to make our activities feasible. This shift is essential as it highlights our real needs, which helps to look at the necessity of energy from another point of view. None of us need energy in itself, but we all need light, hot water, etc. and these serve as starting points when searching for local energy solutions according to Blue Economy.

Observing nature six energy sources are found to be the main ones: heat, light, friction, pressure, magnetism and biochemistry. Jorge Reynold's CoroPatch uses energy generated by the micro-electricity of our tissue, energy within and around our body. The human body produces energy throughout its lifetime that would be enough to get a twelve meters long boat container from Mumbai up to the top of Mont Everest. No battery, accumulator, cable needed. Curt Hallberg takes advantage of gravity as a source of energy by its eddy-based technology, which serves drinking water. Electricity can be generated by pH and temperature differences (e.g. some Seiko watches gained energy from the difference between the temperature of body and environment; thin film solar-cells), by pressure, which results mainly from gravity and also called piezoelectricity (e.g. bristol stone under buildings; electricity from the pressure made by sound), by moving (e.g. kinetic energy makes some Rolex and Seiko watches work; energy by the move and pressure of our blood in our veins) and even by CO₂ indirectly (Gunter Pauli, 2010).

After seeing the opportunities of the Mediterranean Ring and the Blue Economy we are now turning to the analysis part of our essay, assessing the two concepts by futures wheels and building scenarios in the end. First we create a futures wheel with Mediterranean Ring in the center and explain our findings in detail.

IV. The Mediterranean Ring – STEEP analysis



2. Figure: Futures wheel – The Mediterranean Ring. Source: own figure based on Jerome C. Glenn, 2000.

Such a huge and extensive investment like the Mediterranean Ring has many consequences. In order to cover the most important ones, we decided to go along all the aspects of STEEP analysis that are social, technological, economic, political and environmental.

Our focus is on the European Union, which in fact consists of developed countries that are highly industrialized and dispose of a high GDP (Gross Domestic Product) and HDI (Human Development Index) (Business Dictionary, 2011). This is the cause why the *social* effects are not so distinctive and significant in the member states. The medium term social effects are due to the state subsidy that renewable energy sources enjoy and that are paid by the final consumers. Therefore, at the time when the price of the investment still not returns, only the comfort of living will improve in the way of perceptible pollution reduction. But considering long term effects that are our goal, the standard of living will grow by 2050 as the feed-in tariff is dropped. People possess extra money through their savings on lower energy price, which they can spend on what they could not afford yet, for example services like special medical care, healthy food supply or sport opportunities. To stay by the aspect of public welfare, the investment will create new job opportunities which on the one hand contributes to the higher standard of living (but in a much smaller percentage than it would do in African countries) and on the other hand, it gives the place for those enthusiast green professionals to manage the operation who could not exploit their abilities so far.

We examined the effects in Africa separately from Europe as the concerned countries fall to a different category and all the consequences can cause a relatively greater change in quality. First of all, we emphasized the social aspect and cultural factors were taken into consideration. Being a project supported by the European Union, the investment would bring foreign workforce – engineers, managers, specialists to the African countries forming a diverse environment. The large amount of foreign direct investments creates many new work opportunities (new workplaces and better salaries) which cause an increase both in horizontal and vertical social mobility. According to that, the movement of local workers will start from one company to another because of the more attractive conditions and there will be a greater unevenness as they can get into higher positions than they were so the gap between the rich and poor will further grow. By the fact of this and other later assumed developments, the life expectancy in target countries will also increase.

All the psychological consequences are because of the extensive use of green technology which set a yet non-experienced example for the inhabitants (both in Europe and in Africa). When the adaptation is successful, environmental consciousness will definitely

raise. This change in mind will shepherd people toward an eco-friendly lifestyle, which results in a strengthening trend for sustainable energy.

Due to the extra energy supply and job opportunities that the investment can ensure, an increase in public welfare will be observable leading to a generally higher standard of living.

This increased public welfare puts up the money for education. Therefore, the needed workforce can be trained on the spot, which is more cost-effective, better involve the local population which also helps the general acceptance of the investment. The Mediterranean Ring sets goals for the education and the education sets goals for the children. If they learn enough and also acquire a language – in the evolved diverse environment it is crucial- they can get to the foreign companies.

Secondly, we collected some possible *technological* effects. The deployment of solar cells around the Mediterranean Sea comes together with the associated technology. By associated technology we mean the following: deployment of super network that is able to transfer the electricity to the European Union, safety technology to ensure security around the solar cells, administrative and telecommunication units and headquarters. These generate a huge innovative potential that will attract several research and development units too and the spread of every technique will accelerate. This new source of energy will also affect the energy-based industries like car or electronic devices. When such industries turn to this green, renewable and forever available source of energy they will also have higher costs.

According to our speculations on *economic* impacts the project will behave as an instinctive force in Africa. Due to the FDIs (Foreign Direct Investment), that bring foreign capital and know-how to the domestic environment, both hard and soft infrastructure will boost contributing to public welfare. In hard infrastructure significant changes will be observable in transportation (roads, traffic lights and street lighting, airport), in energy (evolvment of local electrical power network) and in communication (international mobile phone and television networks, general Internet access). In soft infrastructure the changes are expected to occur in institutional (financial sector, emergency services), industrial (industrial parks due to the large amount of energy supplied) and social (schools, health care). These developments will result in the economic openness of the concerned countries, attracting new trading partners and strengthening their position globally. They may even have a balance of payment surplus, as their exports (with the added renewable energy export) exceed their imports. Therefore we can tell that this investment also contributes to the competitiveness of Africa.

The European Union voted for a budget for 2011 containing five major points among, which sustainable growth takes 45.5 % and preservation and management of natural resources takes 41.3 % of the total budget. In terms of money these together mean more than 110 billion euro, in which the ca. 400 milliard euro cost of the investment of the whole project (solar cells and network) can be fit (European Commission website, 2011b). But a very important question has not yet been raised that is how this project will affect the relationship of the EU with Russia. What we already know is that Russia is the biggest energy supplier of the EU which accurately means 37% of oil, 24% of natural gas and 18% of solid fuels, 14% of nuclear power and 7% of renewable (Dr. Fraser Cameron, 2011). Using the solar energy coming from the desert as an alternative energy source, these amounts will definitely fall.

It is important to approach this point from a *political* aspect too. For years, the European Union has been trying to reach a sufficient diversification in order to reduce risk and reach a secure energy supply. They import gas not only from Russia, but also from Norway, Algeria, Qatar and Nigeria. Beside these the EU also made arrangement to start other pipeline projects like the North and South Stream as well as the Nabucco. But it could be the first time that such an extensive plan of great capacity for a renewable energy source is considered. This brings the situation to new dimensions. As we have already mentioned, the Mediterranean Ring could cover 15% of the Union's energy demand, enhancing Europe's competitiveness. That could mean a 15% reduction in dependence on Russia which enables the EU to take further substantive actions in the energy market. We should also consider that a kind of negotiation can also occur. Russia is the third largest CO₂ emitter of the world and will be heavily affected by climate change. On the contrary, Russia possesses a huge amount of potential renewable energy resources. All these factors bring the idea of a possible negotiation based upon climate change, which will result in a win-win situation; energy security for Europe, sustainability for Russia (Dr. Fraser Cameron, 2011).

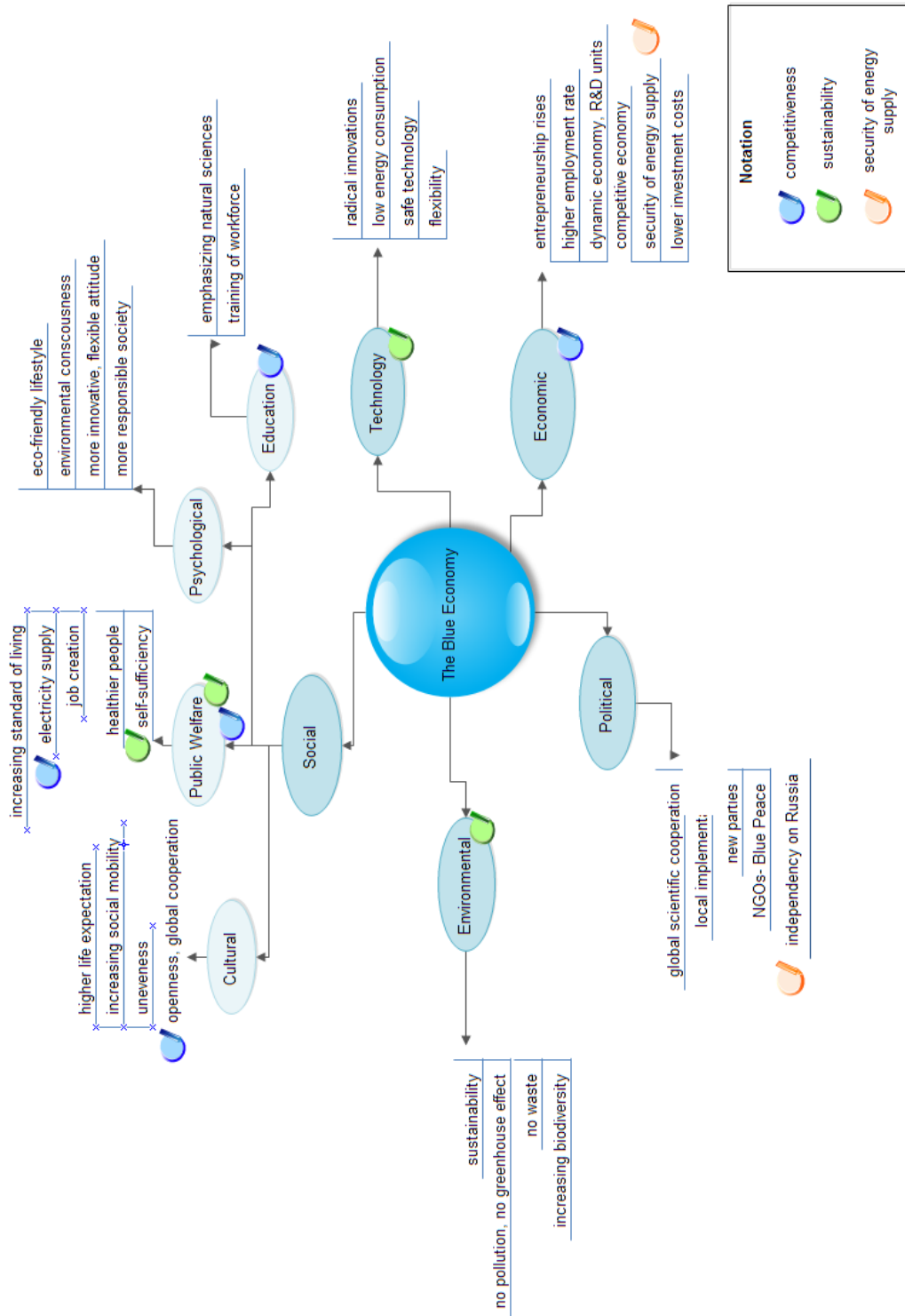
In Africa the western political impact through the investment are two-sided in politics. EU-friendly parties may gain importance. On the one hand, other negotiations can occur concerning those African countries that are not part of the project. But on the other hand, the participants will become a new competitor for Russia creating tension in the region. The danger of terrorism is another non-avoidable threat that the governments should consider as the solar cells are perfect targets for terrorist with which they can eliminate a certain percentage of the energy supply of the EU. As another consequence of the project we assume that the green political parties will emerge and even become more powerful.

Almost all the renewable energy sources have the same effect considering the *environmental* aspect. They „encompass a continuously evolving group of methods and materials, from techniques for generating energy to non-toxic cleaning products” (Green Technology, 2010). It leaves the biodiversity unaffected and causes no harm for health. What is more important, it does not contribute to the greenhouse effect. Therefore the environmental goals of the Mediterranean Ring are sustainability so creating a system that can operate infinitely in the future, waste and pollution reduction and innovation that is introducing a new alternative of feasible energy source (Energiaporta website, 2009).

Throughout the futures wheel analysis we found that many of the consequences of the realization of the Mediterranean Ring would contribute to achieve the European Union’s three energy goals, meaning that the project is worth to be taken into consideration by the EU.

After getting through the analysis of this green project we would like to present whether The Blue Economy fulfills the three main energy goals by 2050 and also its main consequences.

V. The Blue Economy – STEEP analysis



3. Figure: Futures wheel – The Blue Economy. Source: own figure based on Jerome C. Glenn, 2000.

The consequences of turning our economy into “blue” are considered and systemized with futures wheel. The possible impacts are again divided to social, technological, economic, environmental and political consequences.

Social impacts are inevitable, as the spread of Blue Economy would need the society to adapt to new principles, ways of operations, thus society would be largely influenced by the “blue” phenomena. A cultural consequence could be a higher life expectancy. Imagine, there is no pollution and there is a boosting economy fueled by competitive innovations resulting in higher standards of living. Higher standards of living – most usually indicated by GDP – correlate with higher average life expectancy (P.A.P.-Blog, 2011). And higher life expectancy would probably mean an ageing population (unless the increase in new born children offsets it), which would have a large impact on cultural life of a society (it may be more conservative and risk avoider).

Social mobility (vertical) could also be enhanced by becoming “blue” based on the assumption that Blue Economy mainly rests on innovations and entrepreneurs who can come from even lower social classes as innovations are not capital intensive; the point is the idea and one’s social background and means do not count. A higher level of vertical mobility can reduce the gap between lower and upper class, and on the other hand cost-efficient, sustainable innovations would counteract unevenness in society by offering solutions available not only to upper-middle class, (as green economy does according to “blue” criticism).

One main effect of becoming “blue” would be the openness of cultures. Openness largely contributes to competitiveness as it is a way to acquire the most efficient technologies. The concept behind pioneering researches all around the world is to cooperate globally and share innovations. Sharing our findings with other culture needs trust and openness from both parties. Scientists are already cooperating on many levels, but to introduce an innovation the society must accept it, otherwise it will not be used and will be left behind with other ideas failed.

Still within social consequences psychological impacts should be mentioned. The trend for sustainable energy and development would go with the environmental consciousness and eco-friendly lifestyle of the society. The phenomena of sustainability and environmental consciousness are going hand in hand and are reinforcing each other without knowing which could have caused the other. But it is clear that such a shift in attitudes is backed up by some changes in people’s psychological structures. Becoming more responsible for present and future generations and more open minded not only to adopt to innovations but even to look

for them assumes that creativity and critical thinking are largely emphasized and recognized by the society.

An increase in public welfare is also presumed as a result of the growing level of standard of living, which is enhanced by wide-spread, cheap and technologically clean energy and electricity supply and by jobs created (100 million within 10 years according to Gunter Pauli) by the implementation of Blue Economy. Such a development would both enhance competitiveness and sustainability. Self-sufficiency could be reached. Pollution-free producing would prevent serious illnesses (lung cancer, asthma, allergies etc.) largely contributing to public welfare. Health is promoted also by some “blue” innovations such as Coropatch (Gunter Pauli, 2010).

Changes might occur in education. Taking natural ecosystems as the main sources of efficient innovation calls the attention to natural sciences in education. Observing natural processes and learning more physics, biology and chemistry may be the result of the spread of Blue Economy. Education in school is one part; the other is educating the workforce to meet the requirements of the actual jobs created by the Blue Economy. The development of education is a key issue regarding competitiveness as it is indispensable for the research and development sector, which is the basis of the Blue Economy.

Technological consequences of the possible emergence of Blue Economy are numerous and are contributing to the sustainability of the system. First and foremost we should think of radical innovations. Of course every innovation is new as it is in the word, but the ideas offered by Blue Economy are usually not even similar to old technologies and are working in a whole new system and business model, meaning that the ideas are innovative on many levels. Blue Economy is not only offering new ample sources of energy, but is introducing devices, tools with low energy consumption; concordant to it is already quoted principle: “energy is never the goal in itself; it is always a tool to reach the goal” (Gunter Pauli, 2010, p. 197.). The serious transformations in technology need a high level of flexibility. A flexible technology industry is a must as continuous research and development to imitate nature’s solutions is consistent part of the Blue Economy. Then, the new technologies would be clean and safe; otherwise they would not fit in the “blue” concept.

The name Blue Economy implies that it is about a new type of *economy*, not the business as usual, not the green or whatever, but the blue one. So it is not surprising that the differences between today’s and blue economy are great. One thing is that entrepreneurship would rise as the many innovations need people to implement them locally and as the ideas presented by Pauli are usually not capital intensive and are feasible with lower investment

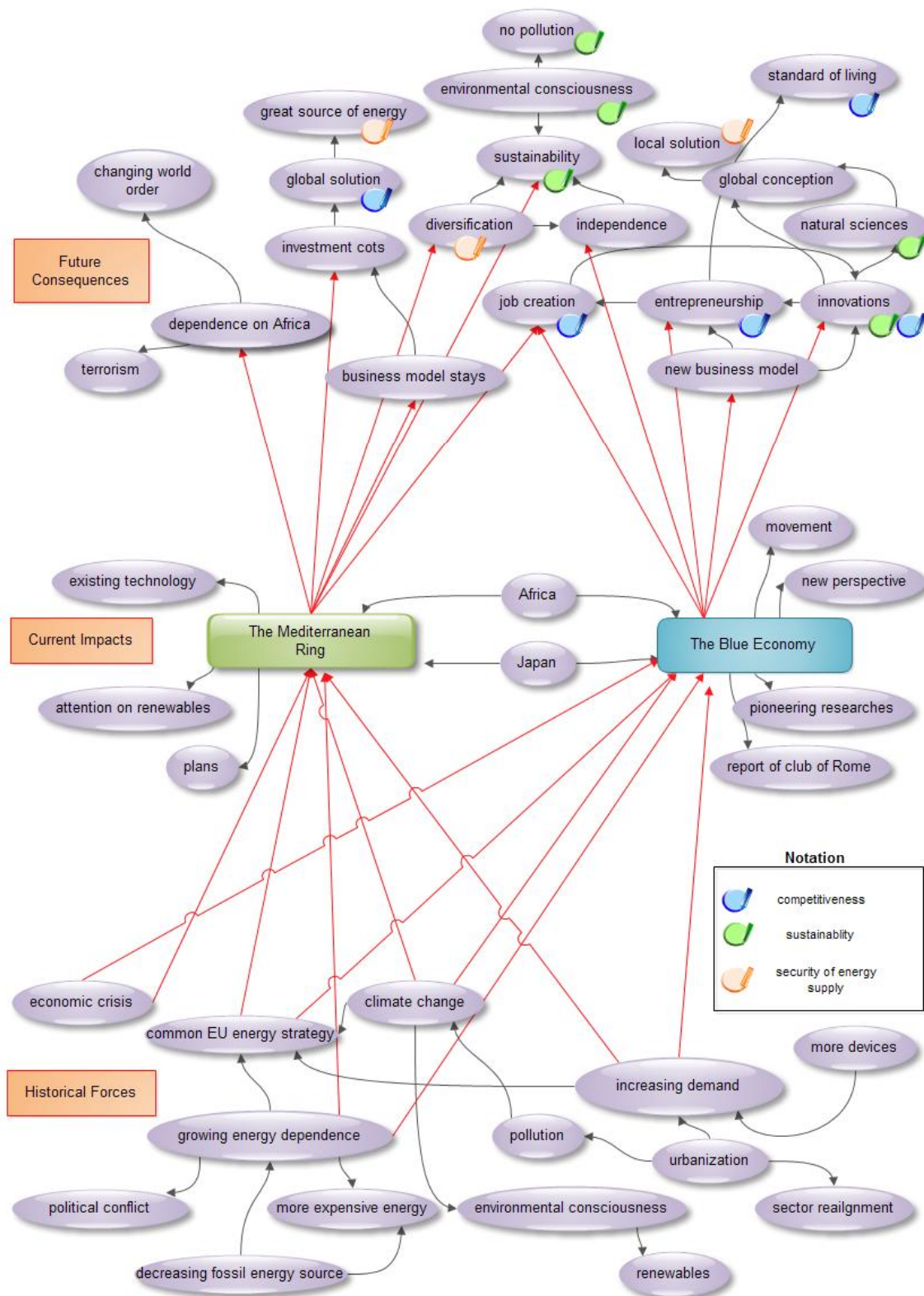
costs. The book Blue Economy showed much room to investors who are ready to launch new businesses and this may be a key driver of a prospering economy according to the large correlation between entrepreneurship and economic growth, which suggests that there is a strong association of the two factors (Global Entrepreneurship Monitor, 2000). In other words a dynamic economy with an emphasis on research and development and with a high level of entrepreneurship would result in a competitive economy. The many jobs created would positively affect the unemployment rate most probably leading to a higher economic output. All these economic affects would make the EU more competitive.

Assessing *political* consequences of the Blue Economy we would like to mention the independence from Russia, which for the time being constitutes a main source of economic and political vulnerability (as it was unfortunately proved by the energy crisis in 2006, 2009). The security of energy supply would mean a great political strength to the European Union. The efficient implementation of the Blue Economy would require a global scientific cooperation, which would need trust and friendly, open political relations between the partners. Though Blue Economy emphasizes local solutions to all the needs emerging, globalism does not fall apart either. On the contrary, it is becoming vital to the functioning of Blue economy as it is based on common pioneering researches that are directed by scientists, entrepreneurs from all around the world who share their findings in order to reach mutual benefits. The spread of the new “blue” concept could contribute to the appearance of brand new parties analog to green ones (e.g. Blue Peace).

Blue Economy would be a great relief for the *environment*, which is now and according to business as usual scenarios, is at the very end of its tolerance and capacity. No waste and no pollution is generated. Biodiversity is not only preserved, but it also increased; e.g. Paolo Lugari managed to regenerate forests on the Vichada savanna by the help of a special mushroom (Gunter Pauli, 2010). To sum it up Blue Economy relies on sustainability.

After the analysis of the futures wheel on Blue Economy it is worth to compare again the impacts with the EU’s three main strategic goals. We found that the Blue Economy has the potential to reach the desired three aims: competitiveness, security of supply and sustainability, thus it could be an alternative to European Union strategy.

VI. Futures Wheel Version 3: Considering impacts from Past to Futures



4. Figure: Futures wheel – Version 3. Source: own figure based on Jerome C. Glenn, 2000.

Assessing the possible consequences of both the Mediterranean Ring and Blue Economy separately we would like to give an overview of the two phenomena together in one model by the help of the futures wheel referred to as Version 3 by Jerome C. Glenn, which is a variation of the original futures wheels by creating three dimensions based on time (namely past, present and future trends). We somewhat modified this version of futures wheel by putting two current trends in the middle (leading to different consequences) evolving from the same historical forces. Accordingly the futures wheel consists of three levels: historical forces, current impacts and future consequences. (We again – as in the whole essay – assess future impacts up to 2050.)

Historical forces are drivers that existed or still exist and that have a role in the emergence of the two trends discussed. Demand for energy increased radically in the industrial revolution and continued to globally grow ever since. The gross inland consumption within the EU was rising moderately from 1998 to 2006, it remained relatively unchanged during the period from 2003 to 2008, from 2006 there was even a minor decrease (Eurostat, 2011) strengthened by the financial crisis. So on the whole the last decade was characterized by an increasing demand for energy.

Due to its wide impact the recent financial crisis evolving into a global economic crisis is considered as a relevant historical force. The Blue Economy even refers to it as an opportunity and driving force to rebuild our economy in an innovative way, which can answer the challenges of the crisis by offering 100 million jobs created within ten years.

Staying with trends applying globally climate change we are facing must be mentioned. The causes behind global warming are debated; urbanization, economic sector realignment (benefiting services and industry opposed to agriculture), consumerism and pollution evolved hand in hand and are mutually reinforcing each other becoming a main source of climate change. Realizing how serious climate change is environmental consciousness appeared and renewable materials and energy sources started to gain terrain.

An important historical force specific to Europe is its growing energy dependency making the EU highly vulnerable, as it was proved in 2006, 2009 when the Russian-Ukrainian conflict resulted in energy shortages. In order to reach energy independence diversification of sources is encouraged partly because fossil energy sources are decreasing, partly because dependence drives energy prices up. Dependence makes the EU vulnerable that is why a common energy strategy within the EU was made with the already mentioned goals: competitiveness, security of energy supply and sustainability.

All past events somehow resulted in the presence of the two concept: the Mediterranean Ring and the Blue Economy. Neither of it is already implemented, thus when enumerating *current impacts* we are referring mainly to the spreading concepts and the theory itself. A difference between the two ideas is that the Mediterranean Ring is a plan to diversify energy supply by emphasizing renewables (solar energy) within a usual framework by the help of an existing technique (solar cells), as Blue Economy is a movement with a new perspective, offering the findings of pioneering researches as feasible innovations not fitting the usual framework, but new business models. Some innovations are already launched but otherwise Blue Economy is not wide spread. However the fact that it is a report to the Club of Rome and their online activity are very promising.

The recent revolutionary atmosphere in Africa and the catastrophe in Japan are just happening at the time, becoming current impacts rather than historical forces. Both phenomena may have huge long term effect on energy policy and can influence the two projects in focus. African protests most probably are high barriers to the Mediterranean Ring as stability and security are needed in the countries where investment takes place. On the other hand it may have less impact on Blue Economy even reinforcing the concept by serving as an example to the dangers and dependences of a global energy supply solution. The nuclear threat in Japan might promote both projects by turning away from nuclear energy and turning to safe, clean technologies – in a global (Mediterranean Ring) or a local (Blue Economy) scale. We are not going to go into details regarding the potential huge consequences of the two phenomena but it is clear that possible migration, food-crisis, revolutions evolving from the African situation and possible economic downturn, nuclear crisis due to the Japanese happenings would definitely affect energy policy as well. (See the topics in more detail: The New York Times online, 2011a and 2011b.)

The possible *future impacts* of the Mediterranean Ring and the Blue Economy were assessed before, now we are highlighting the similarities and differences between the two scenarios. The main common positive consequence would be sustainability by the increasing environmental consciousness and the nil pollution the two solutions offer. Both of them are steps towards diversification leading to independency, however in the case of the Mediterranean Ring it will not fade away given that the dependence on Africa will inevitably grow. The threat of terrorism or the effects of a changing world order are uncertainties hidden in the concept. On the other hand full independence is promised to be reached with Blue Economy. The difference between the levels of independence the two concepts offer reveals the largest contrast, namely that the Mediterranean Ring is a global, top-down and the Blue

Economy is a local bottom-up way of energy supply. The Mediterranean Ring requires large international investment staying within the framework of nowadays' business model lead from the top by investors, policymakers. As opposed to this Blue Economy operates in a new business model based on a very high level of entrepreneurship, which is necessary to implement all nature inspired innovations. We would like to emphasize the importance of encouraged entrepreneurship as they highly correlate with the standard of living (Global Entrepreneurship Monitor, 2000). GDP and jobs created are expected to grow in both cases; it is hard to compare by measuring; an advantage of Blue Economy is the substantially increased entrepreneurship that can result in higher standards of living as mentioned before. At the point of developments global conception appears as the research and the sharing of innovations take place at a global level. But the end solutions are always coming from local sources and givens resulting in independence regarding energy supply.

To sum up, we found that the major similarity is sustainability (with all its patterns, such as no pollution, environmental consciousness etc.) and the largest difference is that one of them is a global and the other is a local solution to energy supply.

Now that we compared the two projects and concluded both the differences and similarities, we collect the European Union's current driving forces from the aspect of energy policy in order to be able to take the critical uncertainties into our scenarios.

VII. Identifying critical uncertainties

Observing what the historical forces and possible outcomes are, we concluded that the following driving forces are worth to examine in the context of the energy policy of the European Union. First – as it proved to be an efficient and proper method creating the futures wheels – we structured our brainstorming by the STEEP categories: social, technological, economic, environmental and political aspects. After enumerating them, we analyzed them according to their effect and the possibility of their occurrence. We visualized our results in a coordinate system with the axes of uncertainty and effect. By the end of our analysis we could identify three separate groups of driving forces: certainties, irrelevant factors and critical uncertainties.

The *social* driving forces are the following. The European population is highly aging thus naturally decreasing. However it can be offset by migration, so the population might stagnate or even moderately increase. Still we calculated with a decreasing population based on the low number of children born in European developed countries and on the largely shrinking proportion of European population in the world population. The aging population and migration led to current debates in the European Union which will remain as an issue to be solved in the future too, making us to evaluate them as certain and as having great impact on future energy demand.

The European Union is regarded as consumer society, where the primary economic activity is not production but consumption of mainly mass-produced goods and services. The term indicates the reckless attitude of the society, which is easily manipulated by the mass media. Consumerism also extended due to the breakthrough of the many electrical, non-durable devices which made life easier and comfortable. Now that the consumers got used to this huge amount of devices in use, they take the high amount of energy supply as granted. We considered consumerism to be an obvious trend in the present that remains unchanged in the future. The effect of such a persisting trend is very high as it basically determines the energy demand of not only the households but of the industry, transport and services in general.

As a psychological phenomenon we named the growing environmental consciousness throughout the European citizens. The education has a crucial role in raising environmental consciousness as children should be grown up in a way that they acquire all the relevant knowledge about the topic, so about the now existing harmful system and the alternative non-

harmful systems too. The process yet holds many uncertainties: whether the education systems including institutes, schools and teachers really take an effort to enlighten the topic before children and whether the monitoring organizations really control the level of activity. In case the concept comes true the consumer behavior of the new generations will radically change compared to the recent one and so it will have a great impact.

The *technological* driving forces are quiet contradicted. Though in today's European Union the nuclear power plants enjoy priority, it may change due to the recent catastrophe in Japan on March 11, 2011. An earthquake of about 9.0 magnitudes shook the country which was followed by a massive tsunami. Besides causing serious losses in infrastructure and costing many human lives, a new threat evolved due to the destruction in the power plant of Fukushima resulting in a radioactive radiation. The trust in nuclear energy has been shaken and fear came to surface. What the future holds for nuclear energy is uncertain but we can tell that the effect of tearing up with this kind of energy would be huge as many European countries would lose their main electricity supplier units.

Although we can already find some examples for local deployment of solar cells, it is still very rare. Maybe later the inhabitants will discover the opportunities considering solar energy and deploy some units for their own consumption. If it spreads among the people and gets generally in use, the effect of the process can be even bigger than the neglecting of nuclear energy.

If we are at solar energy, we should not forget about the other available, renewable energy resources that are wind, hydro, bio-fuel, biomass and geothermal energy. All these kinds of resources are ready to be exploited and utilized and of course some resources are already available for everyday use. For example, in the European Union the proportion of wind energy rose from 2, 2 % (2000) to 9, 1% of total energy capacity (Wind in power: 2010 European Statistics, 2011, p. 8.). So as investments and measurable steps have already been started, the phenomenon is taken to be quiet certain with a moderately high effect level.

What technology can also add is that the new electronic devices consume less. There exist eco-friendly light bulbs, washing machines and materials too. Opening new goals for the technology and new dimension for the consumers, eco-friendliness will gain more and more importance. Parallel to the acceptance of new environment awareness (including the environmental awareness of the electric industries too), the trend for such a technological change exists and will be even stronger in the next 40 years, besides it will also have a great effect on energy consumption.

The *economic* aspect includes a lot of factors. The US subprime mortgage crisis of 2007 led to a decreasing amount of credit on the financial markets which caused the slowdown of the economy of the USA and – what is here more relevant – the European Union. In this wise formulated European sovereign debt crises shook some member states of the EU, including Greece, Portugal, Spain and Ireland. For example, the Greek government had such an outstanding debt that they even accepted a loan from the European Monetary Union (EMU) and the International Monetary Fund (The Wall Street Journal online, 2010). Current trends show the economic downfall of Portugal as bonds with a value of 4, 23 milliard euro will soon expire while the maximal reserve of the country is 4 Milliard (Index.hu, 2011). Thus the presence of member states that carry budget deficit or are even indebted is certain, although energy policy is less affected by this situation.

Due to the latter mentioned sudden extreme changes, it is possible that the common currency of the European Union – euro – will be unstable. As the outcome of the cooperation (or non-cooperation) of monetary funds and indebted member states can move the currency towards a remaining stable or unstable position, it is considered to be a rather uncertain event. The impact on energy policy is still low as apart from the fluctuating currency energy demand will not change in a significant amount.

What is also possible at this point is the extension of the European Monetary Union. It would mean, that the euro would be in common use in more member states than it does now (Members of the Euro zone are now Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain [Eurocoins.co.uk, 2011]) Benefits of the Euro zone are the reduced costs in transportation, easier raising of money for investments, the depositing in the highest interest country, the enabling of long-term strategy - planning and withholding of extreme market fluctuations (Referationonline.com, 2011). As we can see none of the advantage can cause mentionable changes in the energy policy of Europe and it is not even sure whether any more countries can fulfill the conditions of joining the European Union by 2050.

If we mentioned the advantages of a monetary union, we would also mention the advantage of the Schengen-zone inside the European Union as an economic driving force. This allows free workflow among the countries that are listed as members and many other countries are preparing to join the Schengen-area (e.g. Romania). Therefore, it is a phenomenon certainly appearing, which will even extend in the upcoming years, but from the aspect of energy policy, it makes no decisive point.

The EU is increasingly relying on energy import (hard coal, lignite, crude oil and natural gas) in order to satisfy the demand. Thus we can state that the European Union is now opened to non-member sources of energy. Whether this openness will decrease due to new alternate solutions in the next 40 years we cannot predict, but considering the diversification intends of the EU it is possible that the EU would try to strengthen its independence.

To consider some aspects apart from the EU, we had a look at current energy prices. It can be stated that due to the decreasing amount of fossil energy sources and the monopoly of Russia, energy prices tend to be more and more expansive, and this process will heighten by 2050. The trend is irreversible and has a huge impact on energy policy.

Another economic trend showing up in many countries is the realignment of the economic sectors. The conventional order of agriculture (primary), industry (secondary), services (tertiary) and research and development (quaternary) is changing as services gained the importance for today's people and research and development together with information technology is getting a crucial role. This securely projects the situation in the future where there is intensive development and dynamic competition.

The earthquake and tsunami in Japan (March 11, 2011) are also accounting for large, but uncertain effect. An economic downturn in Japan can spread globally. One big wild card is the supply of silicon wafers (which are necessary for chip fabrication), as Japan accounts for about 60% of the world's supply (according to the estimation of IHS iSuppli) (The Wall Street Journal online, 2011). Automobile industry is also affected: e.g. Hitachi Ltd. factory (making 60% of the world's airflow sensor supply) was shot down forcing General Motors Co. to shut a plant in Louisiana, and Peugeot-Citroen to decrease production at most of its plants in Europe (The Wall Street Journal online, 2011). On the other hand, the role of nuclear energy is shaken by the events (e.g. Fukushima) that are not even over yet, strongly weakening the trust in nuclear plants. A nuclear catastrophe may result in the shot down of the plants all around the world, causing serious difficulties in energy supply in Europe (13.4 % of EU gross inland consumption in 2008 was backed up by nuclear energy [Background information for the European Council, 2011]).

We have already mentioned some *political* concerns, like the intense for diversification which would help to reach the energy independence of the European Union. Yet these are only weak signs that are quiet unstable, they may not occur. In case they do and the EU manages to reduce its energy import, the energy policy will change.

There are also some recent political events that influence the EU. First, the African revolution and the close to war situation in the Middle-East and in North Africa can lead to

the intervention of the USA, and other European countries, as it is already happening (NATO had agreed [24 March 2011.] to lead the allies in maintaining the no-fly zone in Lybia [The New York Times online, 2011c]). The spread of the war is a great danger of the current situation. Persisting instability in the region would delay the economic development, as no one would take the risk to invest in countries where civil war is going on and bombs are part of the everyday life. Such a future can not let the Mediterranean Ring happen. On the other hand the democratization and the decrease of corruption could lead to an economic boom and even the Mediterranean Ring would have the chance to be built. In other words the outcome of the recent African political situation is highly uncertain and has big impact on European energy policy, thus it is a critical uncertainty.

The last few decades were about globalization that became extremely fast as a result of the technological development (internet etc.), on the other hand there is a tendency in Europe of shifting to the right in the political arena (Spiegel online, 2010 and Guardian online, 2011), where nationalism or even xenophobia can appear opposing to globalization. Nations may close in, which can cause the European Union – thinking extreme – to come to a dead end. From a European energy policy point of view it is obvious that such a very uncertain collapse of the EU would have large impact on the continents energy policy.

The last political concern to discuss is the high level of bureaucracy that unfortunately makes the operation of political and decision making bodies very inefficient. The launch of a new issue takes so much time that it even get outdated by the time of implementation. Bureaucracy is estimated to relatively certainly have quite a high impact.

Environmental concerns are strong today and most probably remain a prior issue. Climate change is agreed to be going on by the majority of scientists assuming that the growing proportion of heat-trapping greenhouse gases in the atmosphere (caused by human activities) lead to global warming (European Commission website, 2011b). Climate change is quite certain to continue and would have extreme consequences not only the energy policy, but on the whole eco-system involving humanity.

Another phenomena related to climate change is that green area is shrinking globally. Massive scaled deforestation (forests cover around 30 % of the world's land area, but areas with the size of Panama are lost every year (National Geographic online, 2011) and decreasing green space due to urbanization are probably going to continue, however it is not going to have such a strong effect in itself on European energy policy.

It is considered as a fact that we are going to run out of fossil energy, however the time we arrive there is debated (oil and gas are predicted to disappear first and coal the last

within 250-350 years (Green-energysaving.com, 2011), though this is only one forecast from the many). Adding that fossil fuels represent up to 80% of the energy mix of the EU today (Background information for the European Council, 2011, p. 4.), it is clear that the issue has a big impact.

Assessing all these environmental threats the question of environmental protectionism and consciousness arises. What will the society answer to climate change? According to Jared Diamond (Diamond, 2005) the question is crucial as civilizations have collapsed because of “eating up” natural sources, which served as the basis of their lives. So the impact of environmental consciousness is high, still it is doubtful if it is going to appear.

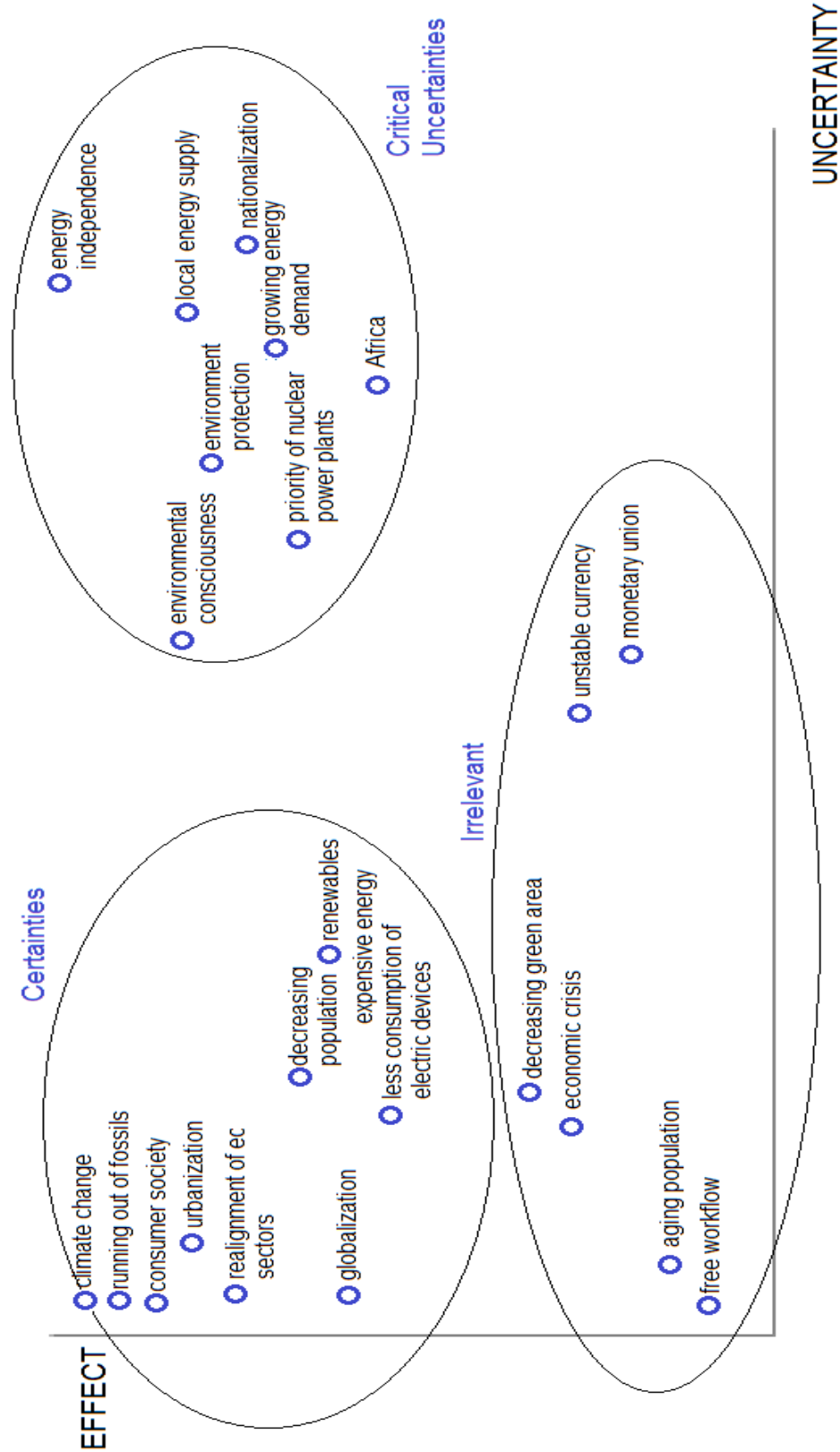
To get an impression how the trends enumerated relate to each other based on uncertainty and effect according to our assumptions see the coordinate system below. By the help of the coordinate system we grouped the trends into certainties, irrelevant trends and critical uncertainties.

The *certainties* are happen to be the following: climate change (global warming), running out of fossil energy resources, consumer society, urbanization, realignment of economic sectors (services in first place), population decrease (though migration may avoid it, e.g. Africa etc.), more expensive energy prices, globalization, high level of bureaucracy, eco-friendly electronic devices (that consume less) and the use of renewables.

We found *irrelevant* – from the perspective of energy policy in the European Union – some of the trends: decreasing green area, budget deficit and indebtedness among EU member states, openness (economic), unstable currency, monetary union, aging population, free trade and free workflow.

The *critical uncertainties* we found are energy independence, decrease in nuclear power plants (Japan), local energy supply (innovations), growing environmental consciousness, growing nationalism in member states (disappearance of the EU?), environment protection, Africa (as a result of revolutions in 2011 EU’s cooperation ends with Africa at any level), increasing energy demand.

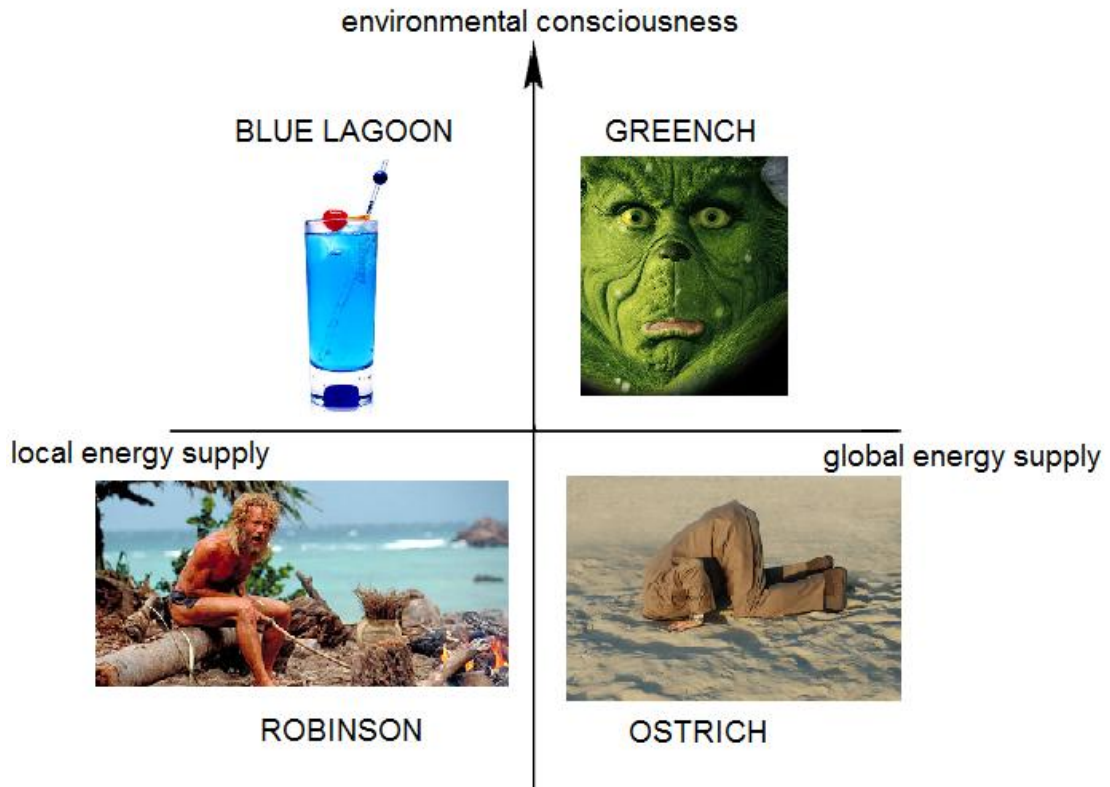
The aim of the assessment of the trends was to get to the critical uncertainties, which are going to be the key drivers when building scenarios. So having identified the critical uncertainties we are now able to build our scenarios.



5. Figure: Uncertainty-effect coordinate system. Source: own figure

VIII. Scenario building

We are going to build scenarios and at the end analyze them with special attention to the EU's three energy goals. (The methodology of scenario building is based on Kristóf Tamás, 2001.) After laying down the critical uncertainties prevailing in the issue of energy policy in the European Union we can start to narrow them in order to identify the axes according to which we are going to build the scenarios. Taking another look at the critical uncertainties we realized that environmental consciousness and environment protection are not independent from each other. From the two we chose environmental consciousness to be the independent one that determines the level of environment protection. We came to a similar conclusion in the case of African energy supply as it is related to the question of local energy supply; African energy as a global solution would be on the opposite pole of the imaginary local energy supply axes. Energy dependency is also influenced by decision of the EU, if it is for local or global energy supply; we thought that local solution means independency, while global involves a level of dependency. We decided to evaluate the remaining three critical uncertainties (the issue of nuclear energy, growing energy demand and nationalization) less comprehensive when it comes to energy policy. In other words the two axes based on which we created the scenarios are the local or global energy supply and the level of environmental consciousness. The axes we arrived to are similar to those of the IPPC climate scenarios (Ippc.ch, 2011), proving our outcome to be relevant. The two axes create four scenarios, which we call the Blue Lagoon, the Greench, the Robinson and the Ostrich scenarios, and which we describe respectively.



6. Figure: Scenarios. Source: own figure

VIII.1. The Blue Lagoon scenario

In the Blue lagoon scenario energy is created locally and there is a high level of environmental consciousness. This scenario is just the opposite of the business as usual scenarios. The people are environment conscious, thus the protection of the environment is a precondition of any measures no matter if it is a business or a political one. *Sustainability* is a key term and it is to be taken seriously, meaning that all technologies are examined before implementation if they are really clean and sustainable. The decision is made by thinking in processes similar to those of natural ecosystems, where the output of one activity is the input of another fitting in the circle of life. So the people are aware of the fact that if something is renewable that does not necessary mean that it is truly sustainable. As a result there is no pollution and waste making the environment pure and healthier, where biodiversity is not threatened and where illnesses due to pollution disappear.

The standard of living is high in Europe as the continuous innovations offer many job opportunities and as low level of entry barriers enhance social mobility and entrepreneurship; the large gap between poor and rich is somewhat diminished.

Europe is independent regarding energy ensuring the *security of energy supply*. And it can account for its energy demand not by nuclear and fossil energy sources, but by heat, light, friction, pressure, magnetism and biochemistry. Energy demand is low – as the devices' consumption is low – and can be supplied from local sources through innovations that are the result of a scientific and technological breakthrough; a mobile phone can be charged by the energy human body generates.

The society – apart from being environmental conscious – is opened for innovations. Natural sciences and business studies are emphasized in education, and the level of entrepreneurship is very high. Among economic sectors the quaternary research and development is in the first place making Europe *competitive*. Although innovative solutions are local the scientific research creating them is based on global cooperation. Thus international relations are developed and political rivalry is offset by the common aim of sustainability.

The Blue Lagoon scenario is basically an interpretation of the Blue Economy concept by Gunter Pauli that is what the name of the scenario (Blue Lagoon) is meant to indicate.

VIII.2. The Greench Scenario

The Greench scenario is located between the global energy supply and the higher level of environmental consciousness pole in our coordinate system. The scenario refers to the character of the Grinch as his green color represents all of the ongoing processes of this scenario. It is global as the world is searching for the most satisfactory solutions of energy supply, ignoring and crossing borders. For example, there are huge investments of solar cells in the African deserts that provide energy for the European Union and for African countries too while in the USA the main energy sources are wind and water energy. The education and media together shepherded the society to an extremely high level of environmental awareness and intend to preserve this status.

Now the society pays a critical attention to every activity and does not allow the processes to turn back. The population does its best at their level: using biodegradable

substances, selectively collecting garbage and take care of unnecessary water and electricity consumption while the leading layer continuously seeks the best and most sustainable ways of energy supply. Thus, the energy demand shows a radical decrease. Due to the eco-friendly lifestyle and increased living standard, the general life expectancy is extended.

Basically, the world is surrounded by such technology that fulfills the conditions of being green without any exception. The world's perception changed due to the dramatically increased environmental awareness and turned to the renewable energy sources. Fossil-based industries have been disappeared and so coal (burned to generate electricity), petroleum (for transportation), natural gas and uranium (for nuclear power plants) are not considered as energy sources any more. Now solar cells, wind-based power plants, geothermal and biomass mean the main energy source. Of course this causes significant changes in every sector, for example transportation lies on a new basis that is solar energy. As an effect of all the previously mentioned, the emission of greenhouse gases that are harmful for the atmosphere of the Earth like CO₂, CH₄, O₃ are now eliminated and so it moderates the greenhouse effect. Therefore, it contributes to *sustainability*.

The environment is in focus of all activities. Water is proper for drinking, the climate satisfies the features of the four seasons, there is no smog and green area covers 40 percent of the cities.

Economically speaking the whole transformation creates a situation where all the countries in the world are participants of a global energy trade. The tertiary economic sectors, services, now enjoy the priority among all the economic sectors. There is concentration on own comparative advantages, which the global cooperation let happen, the green life-style is *competitive*.

Although the international energy supply works efficiently due to the global cooperation, the system holds the risk of an African solar or American biomass energy monopoly, which might lead to political tensions. So since the energy independence cannot be reached everywhere it creates a threat to the *security of energy supply*.

VIII.3. The Robinson Scenario

At the quarter of the coordinate system where there is a low level of environmental consciousness and local energy supply is the Robinson Scenario. Robinson is the hero of

Daniel Defoe, who after being shipwrecked, stuck on an uninhabited island where he had to make everything for himself from what the island provided locally, which meant a great regression in his standard of living. In the scenario the people are not interested in environment protection issues and therefore simply not take any effort in this field. They exploit the opportunities of local energy supply neglecting the fact that at a point they will run out of them.

A general characteristic of people is that they are concentrating on their individual needs and not on the general demand of the society. Their welfare is based on the available resources and people do not take cost efficiency and sustainability into consideration. Social mobility and unevenness are not an issue as everybody lives from what is given in the local area at a similar level of well-being. The society is thinking in the short run – either as a result of being uneducated either as a result of being simply careless – neglecting the future consequences.

The technology is undeveloped and using conventional, non-sustainable methods to generate energy, like collecting and burning wood. It satisfies the needs of the population for the time being, therefore no innovative or research and development activities are enforced.

The economy with such technology cannot be enough dynamic to be *competitive*. Mainly internal trade occurs instead of external. Agriculture is considered to be the most important of all sectors. Energy demand rather stagnates than grows.

Since people are not involved in *environment conscious* movements they are continuously decreasing their own local energy resources. Erosion, lifeless soil and no pure water are common.

The security of energy supply is another issue that is waiting for being solved. Because of the exploited areas migrations are observable. And there is no trend toward *sustainable* solutions, so the security is far from being achieved. On the other hand, from a political point of view we can talk about energy independence as people relying only on local support are not participants of an international context, thus are not depending on other countries. Both the European and African countries are to inspire their own national economies without the influence of foreign economic partners.

VIII.4. The Ostrich Scenario

The Ostrich Scenario is along the axes of global energy supply and low level of environmental consciousness. The Ostrich indicates the reckless behavior of the society that –

similarly to the meaning of the saying: putting the head in the sand like an ostrich – does not have the courage to face the long term consequences of its activities. In this scenario cross-country energy policies are in progress and an international energy supply is available. The people are not interested in environment protection and therefore are not presenting an environmental conscious attitude.

As the society is unaffected by environment protectionist movements they are not willing to change the way they are living their lives. This is a consumer society enjoying all the advantages of international trade and stuck in that comfort. So there is a rapidly growing demand for energy too. The standard of living is relatively high, but is going to decrease as time passes by and there is a huge gap between lower and upper social classes, and the level of social mobility is low.

The technology supports the international processes: transportation and information technology are the dynamic branches. Since there are no or only a scarce number of renewable energy suppliers – nuclear energy manages to hold its prior position – pipelines and super networks are deployed throughout the European Union in order to enable it to import the needed amount of energy. Innovation and research development supports the EU's *competitiveness* and contributes to the trend of international energy supply.

Global energy supply with the lack of environmental awareness results in a situation where there remains only a limited amount of available fossil sources and this way the energy prices are going up. This generates tension and a heavy competition on the energy markets where the energy exporters become all of a sudden better off (but not on the long run).

The infrastructure and industry sector do not consider their harmful presence in the environment that is highly polluted by greenhouse gas emissions. Further destructions can be mentioned because of the extension of cities which causes the disappearance of natural green areas. *Sustainability* with these phenomena is not fulfilled.

Countries are influenced by the energy policy because of the global supply so the independence of the European Union is a very far goal to reach. The *security of energy supply* is still not ensured, as by passing forward in time the power of energy monopolies are further growing.

VIII.5. Conclusions on the scenarios

The four scenarios we built are operating in a completely different environment, being a result of different trends. First – following the principles of futures studies (Kristóf Tamás, 2001) - we do not evaluate and estimate the probabilities of the scenarios, but we are drawing some conclusions on how the three main energy goals (sustainability, competitiveness and security of energy supply) could be achieved within the scenarios in order to support decision makers and investors facing the different situations.

In the case of the Blue Lagoon scenario sustainability is achieved, still we advise continuous monitoring and developing of the local technology used, because the main strength of the scenario is lying in its innovative nature solving everything from local sources. Entrepreneurs should not stop launching new ideas thinking that they already reached their best. Similarly to ecosystems' circumstances, the impacts of the innovations can change with time proving the necessity of constant development as mentioned before. Which makes the Blue Lagoon scenario competitive is the priority of the research and development sector, therefore education and prospering scientific global cooperation must be emphasized. The society should be educated to be flexible and to have the courage and be extremely opened to apply innovations without hesitation. The danger of the scenario lies in the consequences of political rivalries and of the lack of trust that may block the process of dynamic innovation. Pioneering research and efficient implementation needs the involvement of scientists from all around the world, as it highly contributes to the security of energy supply by ensuring that the technology is safe and clean. So the countries should work for open and sincere international relations.

The Greench scenario is sustainable as the whole economy is based on the usage of green technology. Entrepreneurs should keep on to renewable energy sources and avoid the conventional methods of energy supply because the environmental conscious society would not accept them anyway resulting from the education they received. Thus, ensuring proper education is highly recommended. Searching for global solution – outside of the area of the European Union – is possible and advisable as trends of international cooperation are strong and as it makes it possible to focus on comparative advantages resulting in a higher level of competitiveness. There is a great threat to the security of energy supply, thus it is crucial to sustain good and peaceful relations with the supplier countries.

The Robinson scenario has several weaknesses according to the three main energy goals of the EU. Sustainability is clearly an issue to be improved by raising the general environmental awareness. We suggest educating the society to become environmental conscious by showing them the consequences of pollution humanity causes. The security of energy supply is not assured on the long term that is why we advise to open up both to renewable energy sources and to other supplier countries. Decision makers should acquire a new attitude that is more responsible and takes future impacts in the long run into consideration. Competitiveness also leaves some room to be enhanced; we suggest to invest heavily in education and to shift towards research and development.

The Ostrich scenario is similar to the business as usual case. There is no real consideration of sustainability; therefore we suggest researches on eco-friendly operation backed up with heavy marketing to improve consumers' environmental consciousness in order to be successful and competitive on the long-run. In this scenario there are signs of research and development but still industry and services enjoy the privileges, so we suggest making some steps towards the renewable or again sustainable solutions by educating the society. As the monopoly of energy suppliers are getting stronger, entrepreneurs should not neglect the fact that energy prices are continuously growing. This leads back to the main point that research should be emphasized to find cheaper solutions. For the security of energy supply steps towards diversification should be taken considering both the suppliers (which countries or regions) and the types of energy in use.

IX. Conclusions

After giving advices to future decision makers who may face the scenarios, we can state that from the aspect of the energy goals of the European Union, only two of them are favorable, which are the Greench and the Blue Lagoon scenarios. This conclusion gets us back to our original question if a global or a local solution fits the EU's three energy goals: competitiveness, security of energy supply and sustainability. In our analysis the Mediterranean Ring represents the global, top-down and the Blue Economy represents the local, bottom-up alternative. However we already analyzed both phenomena in detail, we now summarize some of the main findings in a table (7. Figure) to back up our decision.

From the comparison (see 7. Figure) we got to the conclusion, that although both of them ensure sustainability and competitiveness, the Blue Economy manages to provide a higher level of security of energy supply. It is more secure as it is independent, meaning that political tensions do not threaten energy supply directly. Other advantages of the Blue Economy are the following. Smaller measure of energy is enough to operate the devices thanks to cost-efficient innovations that are mainly the result of a more dynamic and efficient research and development sector compared to the economy in which the Mediterranean Ring takes place. Social responsibility is involved in all business decisions, which are operating in a new business model that is flexible and seeks always better solutions in a way that it is mutually beneficial for the society and nature. Such a new business model provides sustainability inherently whereas today's business model (in which the Mediterranean Ring would operate) apart from some sustainable projects is not sustainable as a whole.

	The Mediterranean Ring	The Blue Economy
sustainability	✓	✓
competitiveness	✓	✓
security of energy supply	✓	higher
global vs. local	global	local
measure of supply	great	smaller
environment consciousness	✓	✓
education	✓	✓
R&D	✓	more dynamic and efficient
business model	today's	new
costs	higher	cost-efficient
social responsibility	exist	involved
job opportunities	-	✓
political influence	high	small
involvement of the environment	✓	using biodiversity
helping the environment	-	✓

7. Figure: The Mediterranean Ring vs. The Blue Economy. Source: own table

However in theory we see the advantages of Blue Economy, it is less predictable how it can be implemented, how a new scientific and business paradigm would affect the economy and society. The Mediterranean Ring holds less uncertainties, making it tempting to decision makers in general as they usually prefer calculable investments. Still, in our opinion we should not drop a potentially better idea on the long run only as a result of being conservative, less flexible and totally risk-avoiding. The Blue Economy has the chance to reach a sustainable, competitive European Union with a secure energy supply.

The other conclusion we arrived to and which we would like to highly emphasize is the priority of education. When the society acquires the knowledge of environmental protection through education and through the media they may understand how big responsibility they must take. They may realize what should they do at their level, and the pieces of responsible activities and attitudes would make a responsible and well-educated total. So the involvement of the population is crucial, as they are the actors of all scenarios; they are the ones leading, implementing and using the outcomes of research and development. All in all, social capital has a key role in achieving competitiveness, sustainability and security of energy supply.

All in all we found that both global and local energy supply solutions have the potential to fulfill the EU's energy goals, still after a profound analysis we decided to support a local, bottom-up solution, namely the Blue Economy and we concluded that education (leading to research and development) should be in the first place.

Summary

In our essay – after highlighting the relevance of energy policy in the European Union – we introduced two concepts: a global, top-down one through the Mediterranean Ring and local, bottom-up one that is the Blue Economy.

In order to be able to decide which solution fits better more the EU's three energy goals (competitiveness, sustainability and security of energy supply) we analyzed the two by the help of futures wheels and scenario building.

By the end of our analysis we decided to opt for the Blue Economy (the local solution) as it serves better the security of energy supply and provides a new business model in which

sustainability is an inherent part. We also concluded that an emphasis on education is crucial to sustainable development.

We see room for further developing the topic. On the one hand, continuous futures studies are needed to identify weak signals and changing circumstances that can be influential and therefore necessary for decision making. On the other hand, the concept of the Blue Economy could be elaborated by analyzing how the concrete projects, innovations could be implemented and what social (cultural and psychological) shift is essential for the “blue” approach to spread.

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