AFRICA ON THE EU'S RADAR. A CASE STUDY OF DESERTEC

Lenka Kovačovská*

RESUME

The global strive for energy resources intensified by rapidly growing thirst for energies in China and India is placing Africa on the radar screen of the majority of the energy importers. This fact combined with the depletion of own energy resources and a strive for carbon-free energy, provided incentives for the EU to modify its long-term neglected strategy towards the "black continent". The EU is now looking to Africa - especially its Norther part - for energy security. Besides conventional energy resources - such as oil and natural gas (or LNG) - Europe is planning to take advantage of a unique African climate and promote renewables, especially photovoltaic and water power plants. Electricity generated from these sources should not only help tackle energy powerty on the African continent, but it should be also exported to Europe and by 2050 make up for 15 per cent of the total electricity consumption of the EU. This is the core of the DESERTEC project. Yet, in order to make this extremely ambitious plan come true, the EU will not only have to deal with the competing projects of other energy importers, but also tackle many technical and political obstacles, not to mention extremely high costs of such a project. The aim of this paper is to elaborate on the EU's energy strategy for Africa and the likelihood of its fruitfulness, and this being ilustrated mainly on the case study of the DESERTEC project, its pros and cons. The whole paper is based on the Copenhagen school and its perception of energy security.

Key words: *the EU, Africa, energy security, DESERTEC, electricity, Common Energy Policy, renewables*

List of abbreviations:

ACP	the African, Caribbean and Pacific Countries
BRIC	Brasilia, the Russian Federation, India and China
capex	capital expenditures
CSP	Concentrating Solar Power
EC	European Commission
ENP	European Neighbourhood Policy
EU	European Union

* Ing. Lenka Kovačovská is a Ph.D. student at the Jan Masaryk Centre for International Studies, Faculty of International Relations, University of Economics in Prague, Czech Republic e-mail: lenka.kovacovska@gmail.com.

HVDC	High Voltage Direct Current transmission lines
IR	International Relations
LNG	Liquefied Natural Gas
MENA	Middle East and Northern Africa countries
RES	Renewable Sources of Energy
SET-Plan	Strategic Energy Technology Plan
TEN-E	Trans-European Networks in Electricity
TNC	Transnational Corporations
TREC	the Trans-Mediterranean Renewable Energy Cooperation

1 Introduction

One of the most inflected topics of the current international relations and security studies debate is energy security. It can be - with respect to territorial delimitation - studied on various levels – global, regional or state one. This paper addresses the regional aspect of energy security, e.g., strive for energy security on the EU level, represented mainly by the Common Energy Policy. Despite the importance of energy security for the wellbeing of all the EU's member states, official anchoring of the European energy policy in the EU primary and secondary legislation has been - until recently - marginal; firstly the Lisbon Treaty contains a separate chapter providing a legal basis for it. As European Energy Policy is very heterogeneous and complex, ranging from the creation of the fully liberalised and integrated internal market with electricity and natural gas, the Common External Energy Policy, fight against climate change and promotion of sustainable development, etc., it is embedded in a multitude of EU policies – public procurement, taxation, competition, internal market regulations and state aids, consumer policy and TEN-E projects.

Global energy demand is predicted to increase, *ceteris paribus*, by around 40% between 2007 and 2030, predominantly as a result of rising energy demand in non-OECD countries with China expected to double its annual energy consumption until 2030[1]. Despite the significant drop in global energy consumption in 2009 caused by the financial and economic crisis, we can expect a return to its upward trend after the economic recovery.[2]

[1] For more information see World Energy Outlook 2009, International Energy Agency.
[2] We can witness this trend already now in case of rising electricity consumption.

The global strive for energy resources - intensified by the rapidly growing thirst for energies in China and India - is placing Africa on the radar screen of the majority of the energy importers. These, combined with the depletion of own energy resources and endeavour for carbon-free energy, provided incentives for the EU to modify its long-term (at least in the field of energy) neglected strategy towards the "black continent".

The EU - intensively influenced by the Climate-Energy Package (and its 20-20-20 binding provisions) and its facilitator SET-Plan , and especially by the EU's political role of the world's pioneer in promotion of sustainable development and fight against climate change - is now looking to Africa, particularly to its Northern part, for energy security. Besides conventional energy sources - such as oil and natural gas (also in the LNG form) - Europe is planning to take advantage of a unique African climate and promote RES (renewable sources of energy), above all photovoltaic and water power plants. Electricity generated from these sources should not only help tackle energy poverty on the African continent, but it should also be exported to Europe and by 2050 it should make up for 15 per cent of the total electricity consumption of the EU. This is the core of the EU's DESERTEC project. Yet, in order to make this extremely ambitious and visionary plan come true, the EU will not only have to deal with competing projects of other energy importers, but also tackle many technical and political obstacles, not to mention extremely high costs of such a project.

The aim of this paper is to elaborate on the feasibility of the EU's energy strategy for Africa, illustrated mainly on a case study of the DESERTEC project. The initial hypothesis is that he EU's energy strategy towards Africa is visionary, yet too difficult and too expensive to materialize.

First part of the paper – the Introduction – brings the reader into the course of the study, e.g. energy policy of the EU and the renewed worldwide interest for Africa's energy resources. It also presents the research question and initial hypothesis of the author and methodology used.

The Second (theoretical) part of the paper explains the concept of energy security and its place in the current IR and security studies debate. It introduces core pillars of energy security and also EU's approach towards it.

The third part of the study depicts the role of Africa in the global strive for energy security and describes EU's energy strategy towards Africa – its policy and legal basis, key principles of mutual relations and tools at the EU's disposal to promote this strategy.

All these chapters serve as a basis for the fourth chapter – DESERTEC Project and its Feasibility – that introduces the DESERTEC project and examines its actual feasibility based on the three key pillar of energy as mentioned in chapter 2.1, e.g., geopolitical, technical (including environmental) and economical.

Finally, concluding chapter summarises the findings of the assessment of the feasibility of the DESERTEC project and, presents authors conclusions and compares them with the initial hypothesis.

2 Energy Security and its Role in the Current IR and Security Studies Debates

2.1 The Concept of Energy Security and its Role in the Current IR and Security Studies Debates

The term 'energy security' is relatively new. It was brought to the theory of international relations and security studies by the so called Copenhagen School, represented mainly by **Barry Buzzan**, at the beginning of the 1990s. The Copenhagen School modifies and extends the traditional frame of security analysis. (Buzzan - Wæver - de Wilde, 1998) Besides military threats this school recognises four other kinds of threats – political, economic, societal and environmental. Sufficient and stable energy supplies are crucial for the economic well-being of every state which is a "part of the essential values of the state". (Terrif – Drift – James – Morgan, 2000, p. 137)

Nowadays, there are many different definitions of energy security, capturing various aspects of this term. The European Commission defines it as "*the ability to ensure that future essential energy needs can be met, both by means of adequate domestic resources worked under economically acceptable conditions or maintained as strategic reserves, and by calling upon accessible and stable external sources supplemented where appropriate by strategic stocks*." (Bahgad, 2006, p. 965[3]) **Barton** et al. define energy security as "*a*

[3] Originally stated in: Skinner, Robert and Arnott, Robert. *EUROGULF: an EU-GCC dialogue for*

condition in which a nation and all, or most of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risk of major disruption of service." (Bahgad, 2006, p. 965)[4]

Gawdat Bahgat's definition of energy security refers to "*sustainable and reliable supplies at reasonable prices*". (Bahgad, 2006, p. 965) In his perspective energy security depends on sufficient levels of investments in resource development, generation capacity and infrastructure to meet demand as it grows; and achieving a state where the risk of rapid and severe fluctuation of prices is reduced or eliminated. (Bahgad, 2006, p. 965-966)

In this paper, a newer EU definition of energy security from the hand of the European Commission will be used, e.g. energy security is represented by "*the uninterrupted physical availability of energy products on the market at an affordable price for all consumers, whilst respecting environmental concerns and looking towards sustainable development*." (Towards a European strategy for the security of energy supply, 2000) The main differentiating element of this definition is that it inseparably links classical understanding of energy security with protection of environment and sustainable development.

From all these definitions and understanding of energy security several threats to energy security may be derived. The EU is concerned mainly by political instability in energy producing or transit regions, the distortion of market forces by energy cartels, attacks on supply infrastructure, accidents and natural disasters and sufficiency of resources to meet the world's energy requirements in the decades ahead. (Pribitzer)

Thus, we can summarize that the current paradigm of energy security lies on three pillars:

---

energy stability and sustainability. [online] Available at: http://Europa.eu.int/comm/energy/index_en.html, accessed 4 June 2005.

[4] Originally stated in: BARTON, Barry; REDQWELL, Catherine; RONNE, Anita and ZILLMAN, Donald N.2004 "*Energy security: managing risk in a dynamic and regulatory environment*." Oxford: Oxford University Press.

- geopolitical,
- technological (including environmental),
- economic.

The importance and mutual interdependence of these three pillars stresses also **Anders Wijkman**, MEP and the Vice President of the Club of Rome, according to whom "*the current energy debate is dominated by basically three concerns: energy security, carbon emissions and the price of energy*". (Wijkman, 2008, p. 11)

The upper-mentioned three key pillars of energy security (political, technical and economical) are used in this research paper for judging the feasibility of the EU´s energy strategy towards Africa analysed on a case study of DESERTEC.

2.2 The EU's Attitude towards of Energy Security

Energy security has been gaining on its relative importance over the last decade. This is mainly due to the skyrocketing consumption of fossil fuels (especially oil and natural gas) by newly rising economies – China and India – and thus intensified competition for these resources on the global markets, all combined with gradual depletion of these resources. Additionally, the concept of energy security has been lately partially modified and extended for the aspects of the fight against the climate change and strive for sustainable development (see the change in the EC's definition of the energy security in the chapter 2.1). These two new aspects have been dramatically influencing both domestic and international energy policies of all the key IR players (the EU and its member states, the USA, BRIC countries and even big TNC including) and is also dramatically influencing the flow of investments into the energy sector worldwide.

Energy as such has been at the heart of European integration from the very beginning[5], yet, the Treaty of Rome[6] did not even mention the word energy. Neither did the amending Treaties[7] provide the EU with an overarching legal basis to deal with energy issues. (Andoura – Hancher – Van Der Woude, 2010,

[5] The European Coal and Steel Community Treaty of 1951 and the Euratom Treaty of 1957.
[6] EEC Treaty of 1957.
[7] The Single European Act, Maastricht, Amsterdam and Nice Treaties.

p. 7) However, over the last decade the importance of energy security for the EU and its member states has been growing, predominantly due to regularly repeating political and economic disputes between the Russian Federation and transit countries for the deliveries of fossil fuels to the EU (Ukraine and Belarus), resulting in natural gas or oil interruptions.

From the Finland's EU Presidency in 2006 on, energy security issues were among the top priorities of all the presiding countries. This led, among others to the adoption of new EU energy legislation, mainly the Climate-Energy package (during the French EU Presidency) and the 3rd Energy Market Package (during the Czech EU Presidency), or more recently preparation of the energy infrastructure package. Plus, more and more often, the EU is trying to speak with one voice with its key fossil fuels suppliers and transit countries.

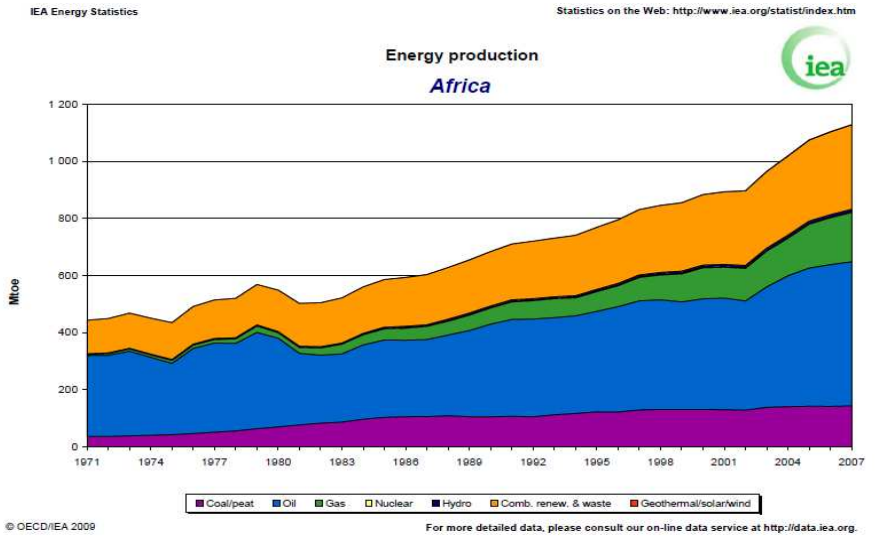
And recently, for the first time, the Lisbon Treaty provided for a legal basis for an energy policy, which has brought new attention for energy as a policy issue at European level. (Andoura – Hancher – Van Der Woude, 2010, p. 7) Energy receives an explicit recognition in Article 74 of Part I of the Treaty on the Functioning of the European Union (TFEU) as one of the Union's shared competencies. Article 194 TFEU sets four main arms of Union policy on energy: to guarantee the functioning of the energy market, to ensure security-of-supply of the Union, to promote energy efficiency and the development of new and renewable forms of energy and to promote the interconnection of energy networks.

3 The EU´s Energy Strategy towards Africa

3.1 The role of Africa in the Global Strive for Energy Security

Africa has several resource-rich countries, mainly concentrated in Northern and Southern Africa and the south of the Great Lakes region and around the Gulf of Guinea. (For energy resources of Africa see Tab. 1 and App. 1)

Tab. 1: Energy Production of Africa



Source: IEA 2009

With the ongoing depletion of natural resources in traditional exporting regions (such as Russia and the North Sea), growing thirst for oil and natural gas of China and India and continuous technical development - decreasing costs for exploiting and transport of fossil fuels (especially LNG technologies) - has brought Africa back on the radar of the world's biggest energy importers. Besides new external players, such as Brazil, India and China, also Africa's traditional partners, such as the United States, Japan and Russia, are showing renewed interest in the continent.

Especially China has been very active in its African energy strategy. As **Peter Pham**, director of the Africa Project at the National Committee on American Foreign Policy puts it "*Cut off from African natural resources . . . China's growth stops*". (Sheikh, 2009) Pham suggests that China's investment strategy in Africa - targeting at state elites and big companies while neglecting human rights protection - appeal (contrary to the EU's attitude) seems to be successful.

Russia too has shown renewed interest for Africa's resources, which could be expressed also by the decline of its own natural gas and oil production (post peak-oil phase). According to Pham, Russian firms are trying to "lock in partnerships" with resource producers to form, for example, the "stream of a natural gas OPEC". (Sheikh, 2009)

Even American oil companies have been focusing their attention on Africa and its natural resources, mainly with the aim to mitigate their over-reliance on the imports of fossil fuels from the Middle East. According to Pham "U.S. firms tend to forge production-sharing agreements or explore resource development, but lack carte blanche in their pursuit of oil riches in places like Africa due to U.S. government sanctions and public pressure which puts the United States at "a slight disadvantage" relative to Russia and China." (Sheikh, 2009)

3.2 Policy and Legislative Basis of the EU's Energy Strategy Towards Africa

Over the last few decades, the EU has concluded an increasing number of agreements with Africa, including the Lomé Conventions, entered into with the Member States of the African, Caribbean and Pacific Countries (ACP) Group, the Cotonou Agreement, the South Africa Agreements and the Euro-Mediterranean Partnership and Association Agreement.

A separate EU document intended solely for Africa and promotion of its sustainable development and facilitating the achieving of the Millennium Development Goals is the Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee of 12 October 2005 - EU Strategy for Europe: Towards a Euro-African pact to accelerate Africa's development. (COM (2005) 489)

The aim of this strategy is to mitigate African poverty by stimulating rapid and broad-based economic growth by supporting macroeconomic stability and assisting in the creation of integrated regional markets. One of the biggest constraints of the economic growth identified by the EU is insufficient infrastructure (including transport, communication, water and sanitation and energy). That is why EU's Strategy proposed establishment of an EU-Africa Partnership for Infrastructure.

The Strategy also aims at developing cross-border and regional energy infrastructure through support of the new Forum of Energy Ministers in Africa

(FEMA) and of regional institutions and stakeholders for developing cross-border and regional energy infrastructure, including the enhanced exploitation of renewable and other sustainable local energy sources and services.[8] (COM(2005) 489, p. 29)

Following this Strategy the EU-Africa Strategic Partnership (COM(2007) 357 final). has been established with the aim to pursue four political objectives, namely:

- reinforcement of the partnership, transforming it into a genuine partnership of equals;
- promotion of key issues with respect to development, such as peace and security, governance and human rights, trade and regional and continental integration in Africa;
- joint response to global challenges;
- promotion of a wide-based and wide-ranging people-centred partnership.

The European Commission proposed five specific joint initiatives included in an action plan annexed to the joint strategy Partnership on migration, mobility and employment, Partnership on democratic governance, Political and institutional architecture, An energy partnership and Partnership on climate change. The energy partnership was supposed to create a platform aiming at:

- reinforcing the current dialogue on issues such as access to energy and energy security;
- scaling up investment in energy infrastructure;
- investing a higher proportion of oil and gas revenues in development activities;
- mainstreaming climate change into development cooperation.

With respect to energy infrastructure, both the EU and African countries recognised that increased regional and continental interconnectivity is necessary for enhancing the reliability and efficiency of energy systems. (The Africa-EU Strategic Partnership, 2007, p.18) In addition, both sides intended to strengthen cooperation and solidarity in the sustainable management of their energy resources and continue to promote access to energy, energy security

[8] This support should be provided in the framework of the EU Energy Initiative and the associated Energy Facility.

and safety, and regional cooperation and have agreed to establish the Africa-EU Energy Partnership. The Partnership should address the joint challenges of energy security and diversification of supply, access to affordable, clean and efficient energy services, new and renewable energy resources and climate change. (The Africa-EU Strategic Partnership, 2007, p.19)

In the Lisbon declaration the First Action Plan for years 2008-2010 of the Africa-EU Partnership on Energy was incorporated. The DESERTEC project as such was not mentioned in the plan, yet, it could be partially traced in two of the promoted activities, i.e. promotion of the development of energy interconnections between Africa and Europe; and exploration of the possibilities for launching a major cooperation programme in the field of renewable energy sources in Africa, including the possible establishment of regional centres for promotion of renewable energy and energy efficiency.

The mutual relations of the EU and African countries have been evolving over the decades based on the upper-mentioned set of agreements. Yet, for the first time the EU Strategy for Africa: Towards a Euro-African pact to accelerate Africa's development (COM(2005) 489) from October 2005 anchors the basic principles that govern the relationship between Africa and the EU. The key three ruling principles are:

- *equality*, based on mutual recognition and respect for institutions and the definition of mutual collective interests;
- *partnership*, i.e. developing links based on political and commercial cooperation;
- *ownership,* i.e. strategies and development policies being country-owned and not imposed from the outside.

According to the EU Strategy for Africa the EU should engage with Africa's three levels of governance – national, regional and continental – on the basis of the principle of subsidiarity, i.e., only matters which would be dealt with less effectively at a lower level should be reserved for a higher level of governance.

3.3 Tools at the EU's Disposal

Principal actors relevant for the Africa-EU Strategic Partnership mentioned in the Africa-EU energy partnership are:

- AU Commission/NEPAD, African States, RECs, AFREC, and other African Energy Institutions;
- The European Commission, EU Member States;
- Private sector (in particular energy companies), AfDB, EIB, other IFIs, energy centres,
- civil society and other Interested actors;
- African local authorities.

Moreover, the EU-Africa energy partnership should build on existing instruments, such as:

- the overall framework of the UE-Africa infrastructure partnership and its trust fund (Infrastructure Trust Fund);
- the EU Energy Initiative (EUEI) (EN) and its ACP energy facility;
- the national and regional indicative programmes under the 10th European Development Fund (EDF);
- Thematic Programme for Environment and Natural Resources Management, including Energy (ENTRP).

Besides these instruments, finance should come from bilateral contributions from the EU Member States and African States; African Development Bank, European Investment Bank and private sector contributions. (The Africa-EU Strategic Partnership, 2007, p.61-63)

4 DESERTEC Project and its Feasibility

4.1 Introduction to the DESERTEC Project

The DESERTEC Concept describes the perspective of a sustainable supply of electricity for Europe (EU), the Middle East and North Africa up to the year 2050. It has been described „as being part of an overall intention to create *'a new carbon-free network linking Europe, the Middle East and North Africa'*." (Rhodes, 2010)The concept has been developing since 2003 by the German Club of Rome and a network of experts around the Trans-Mediterranean Renewable Energy Cooperation (TREC). TREC wants to boost the generation

of electricity and desalinated water by solar thermal power plants and transmit the power generated via High Voltage Direct Current (HVDC) transmission lines throughout the Mediterranean region. This should, among others, speed up the process of cutting European emissions of CO_2 and help increase the security of EU energy supplies. (www.desertec.org)

Tab. 2: Structure of the DESERTEC

Source: www.desertec.org

According to **Anders Wijkman**, the Vice-President of the Club of Rome, the central element of this cooperation is the bilateral ENP Action Plans, agreed between the EU and each partner. Implementation of the first eight ENP Action Plans (Egypt, Israel, Jordan, Moldova, Morocco, the Palestinian Authority, Tunisia and Ukraine) is already underway. The objectives of the ENP are to promote solar power supplies to Europe that would lead to increased

investments and business opportunities for the MENA countries, provide new jobs and thereby increase political stability. (Wijkman, 2008, p. 12)

TREC has been involved in the conduct of three studies evaluating the potential of RES in MENA, the expected needs for water and power in EU-MENA between now and 2050 and issues relating to the construction of an electricity transmission grid connecting the EU and MENA (EU-MENA-Connection). These studies were:

- MED-CSP (Concentrating Solar Power for the Mediterranean Region),
- TRANS-CSP (Trans-Mediterranean interconnection for Concentrating Solar Power),
- AQUA-CSP (Concentrating Solar Power for Seawater Desalination) - a study covering aspects of solar desalination.

All three studies confirmed the feasibility of the project with respect to their particular scope of analysis. After the series of feasibility studies, in January 2008, the White Book "The DESERTEC Concept – Clean Power from Deserts" has been published and the DESERTEC Foundation was formed to promote the project worldwide. The DESERTEC Industrial Initiative, established by the Memorandum of Understanding signed in Munich on 13 July 2009, was found with the aim to analyze and develop technical, economic, political, social and ecological framework for carbon-free power generation in the deserts of North Africa. Currently, the consortium comprises 12 companies[9], ABB, ABENGOA, Solar, Cevital, Deutsche Bank, E.ON, HSH Nordbank, MAN Solar Millennium, Munich Re, M+W Zander, RWE, SCHOTT Solar, SIEMENS, the vast majority of them from Germany.

4.2 Assessing Feasibility of DESERTEC Project

Siemens Chief Executive Officer **Peter Loescher** stated that the DESERTEC project is no more far-fetched than the trans-Atlantic telegraphic cable laid by Siemens in 1876[10]. Notwithstanding prominent proponents of the project, there is at least the same number of the project's sceptics and opponents, these being not only technicians and energy engineers, but also

[9] RESERTEC Foundation, 13 July 2009, Press Release, 12 companies plan establishment of a Desertec Industrial Initiative

[10] Desertec: African solar power for Europe, 2009

politicians and public elites. They doubt the very substance of the project, its possible contribution towards the energy security of the EU and, in fact, its viability. Despite the backing of some of Germany's largest high-tech companies and energy utilities, even some of Europe's keenest backers of green energy regard the project as an ill-conceived pipe dream. Professor **Herman Scheer**[11] even went as far as to call it "Fata Morgana"[12].

Is this project – based on imports of electricity from the Sahara desert into Europe – aimed at strengthening the EU's energy security and fulfilment of its CO_2 emission reduction really viable or is the EU only wasting time, money and energy for a Utopia with no real chance of materialising. And hence should not the EU rather focus on a more active role in the global competition for the conventional energy riches of Africa? For assessment of the feasibility of the DESERTEC project three pillars of energy security - according to the current IR paradigm - are vital, i.e. geopolitical, technical (including environmental) and economical.

4.2.1 Geopolitical Feasibility

One of the main ideas behind the DESERTEC project is the fact that it will alleviate the risk of interruptions of energy imports thanks to eliminating, respectively diversifying from the troublesome energy transportation corridors into the EU (mainly tension-prone routes via Ukraine and Georgia) and cutting the over-reliance on the fossil fuels import from Russia. This additional territorial diversification of energy imports, combined with the energy mix diversification (importing electricity generated from renewable sources, instead of fossil fuels) should enhance the EU's energy security.

Yet, the real contribution of this kind diversification towards the EU´s energy security enhancement is at least doubtful and is also one of the most controversial and criticized points of the whole concept. As could be seen at the bellow table (Tab. 3) the Northern Africa does not serve as the best example for stable and conflict-prone region.

[11] Prof . Dr. Hermann Scheer, member of the German parliament, EUROSOLAR president and general chairman of the World Council for Renewable Energy

[12] From Prof. Scheer's presentation of the DESERTEC Industrial Initiative in Munich. In: Scheer, 2009

Tab. 3: Wars and Conflicts in Northern Africa

Source:
http://www.bing.com/images/search?q=Northern+Africa+conflicts+map&FORM=IGRE&qpvt=Northern+Africa+conflicts+map#focal=bfa3cc552c5884867ceb1c94cf012b57&furl=http%3A%2F%2Fwww.africanculturalcenter.org%2Fimages%2Fmap_big_peop_4_6warpol_t.jpg [16 June 2010]

Indeed, MENA region contains many countries that can be considered neither democratic, nor having friendly mutual relationships. Actually, as can be seen on App. 2 - Conflicts and State Fragility in Africa (2000-2005) – political situation in Africa is diversified. On the one hand, some African countries and regions are scarred by violent conflicts or state fragility, or are still in the midst of post-conflict reconstruction efforts, while on the other hand others have been experiencing sustained periods of peace, security, economic and political stability and democratic participation. (COM(2005) 489, p. 10)

Persisting are two chronic areas of conflict and instability: the Mano-River region in West Africa (including countries such as Guinea, Liberia and Sierra Leone) and a line extending from Sudan and the Horn of Africa down to eastern Congo in eastern and central Africa. These two areas are dominated by a large number of countries in conflict as well as a high proportion of fragile states. In the Mano-River region – which is rich on natural resources, (including diamonds and timber) - the conflict has spread over the last ten years across borders and engulfed the entire region in a severe refugee crisis, further contributing to the

regional instability. (COM(2005) 489, p. 11-12)

Additionally, the "HVDC highway" among the MENA countries and the EU should lead through several international borders of the politically instable region, where only obtaining of all the legal documents necessary for the creation of such HVDC lines would be extremely complicated. Plus, even if all the legal requirements were obtained, there is the question of the ownership of the grid, which, based on the troublesome relations among these states, could be very difficult to assign and then preserve. And even if all these more-or-less successfully resolved and the needed grid was build, there would still remain a risk of terrorist attacks on the energy infrastructure or illegal external power take-offs, as can be currently observed in Africa with respect to oil and natural gas pipelines. Hence, the real chance of alleviating EU's dependency on unreliable third states seems to be minimal.

Notwithstanding, the document **Roadmap 2050** by the European Climate Foundation analysing possible carbon-free future of the EU, presents alternative responds to the objection that Europe's security of energy supply would be reduced due to concerns about vulnerability to political instability in the host countries. According to the Roadmap 2050, "the 15% of total EU supply assumed in the 100% renewable scenario would mean no more than about 5% of total supply coming from any single country, and the power would flow across tens of individual export cables. Thus the share of total supply that would be exposed to individual points of disruption is of a magnitude that European system operators plan against today in the normal course of business." (ECF 2010, p. 75) Yet, justification of this relatively optimistic explanation seems – at least currently – doubtful.

And last but not least, with respect to DESERTEC's geopolitical pillar of energy security there is one more aspect worth mentioning. Some critics of the project actually regard the creation of huge solar power plants in the North African countries by European energy companies as a modern form of eco-colonialism, e.g., according to this group Europeans are exploiting poor African nations and are destroying their air and water. *(EurActiv.cz*, 22 July 2009)

4.2.2 Technical Feasibility

The largest accessible but least tapped form of energy on earth is solar radiation on deserts. According to calculations of Dr **Knies,** the annually received amount of solar radiation energy on deserts would equal 80 Mio Terawatt hours/year. This is a factor of 750 more than the fossil energy consumption of 2005, and there is still a factor of 250 if this demand would triple until 2050.[13] According to information on the official web pages of the DESERTEC project (www.desertec.org) satellite-based studies by the German Aerospace Center have shown that, by using less than 3% of the entire desert area of the MENA region[14], enough electricity and desalinated seawater can be produced to meet the growing needs of these countries and of Europe. Power generation from wind energy is particularly attractive in Morocco and in areas around the Red Sea.

The DESERTEC project aim is to make use of these abundant energy sources via installation of solar and wind power plants (as shown on Tab. 2) and then transmit the generated electricity throughout the region via High Voltage Direct Current (HVDC) transmission lines, and to Europe with transmission losses up (at least according to the official project information) to 15%.

Yet, generation of electricity from renewable sources – especially as volatile as in case of wind and solar energy – and its transportation over big distances poses in reality many obstacles and technical challenges. First of all, one of the key central criteria for power generation is its availability at any moment on demand. With respect to RES (with the exception of biomass, hydropower or potentially tidal energy) this criterion is not met because of the upper mentioned high volatility and controllability of their generation and the fact that we cannot currently effectively store the abundant electricity.

[13] With regard to its capacity, i.e. the annually received amount can be estimated in a rather straight forward way, since radiation is quite uniform across the desert regions. The hot deserts cover around 36 Million km² (UNEP, 2006) of the 149 Million km² of the earth's land surface. The solar energy arriving per 1 year on 1 km² desert is on average 2.2 Terawatt hours (TWh), thus yielding 80 Mio Terawatt hours/year. In: Knies, 2008,p. 19) .

[14] The DESERTEC should cover according to Rhodes approximately an area of 17,000 km2 of the Sahara desert (Rhodes, 2010).

The installation of wind and solar power plants Europe has been blooming over the recent decade and utilisation of very favourable natural conditions in MENA countries is just logical next step in using these RES. Yet, what makes installation of solar power plants in the MENA countries even more attractive is the potential for Concentrating Solar Power (CSP). Unlike solar panels, which produce a maximum heat output of 200 centigrade, a solar thermal power plant typically uses hundreds of mirrors to concentrate sunlight for boiling some type of liquid for producing steam via a heat exchanger to drive turbines that generate electricity. (Desertec: African solar power for Europe, 2009) The fact that CSP with storage requires ample space, relatively level terrain and high rates of direct normal insolation, traits that in combination are in limited supply in Europe but are effectively unlimited in North Africa. The fact that Saharan insolation rates remain robust through the winter months adds even more value to the resource. (ECF, 2010, p. 74)

By adding thermal storage systems to CSP plants, they can be relied upon throughout the day and evening and turned up or down in response to demand. Accordingly, as DESERTEC designers claim, by using solar thermal power plants instead of classical photovoltaic power plants the intermittent nature of the electricity generation could be – at least to some extent- mitigated. Thus, the storage problem can be "eliminated" because "solar thermal heat can be stored at night or when the sun is not shining and thus these power plants would be able to continue generating power 24/7" (www.desertec.org).

The technology for solar thermal plants is already established, with plants already feeding power into the grid in California and in southern Spain. However, it has to be proofed and verified in practice for such a huge extent and climate and geographical conditions of MENA countries at first. The installation of the smaller power plants should start till 2020, based on the newest proclamations of EU representatives (especially of the Commissioner for Energy Günther Oettinger), the pivotal power plants could be installed and attached to the grid even by 2015 (probably in Morocco). According to **Alexander Mohanty**, the spokesperson of the Desertec Industrial Initiative, these pivotal projects should proof whether the whole project could be viable. (*EurActiv.cz*, 23 February 2010)

Moreover, once the DESERTEC would materialize, the whole synchronously interlinked transmission grid (North African countries plus the Synchronous Zone of Continental Europe) would have to cope with a very high fluctuating flows of energy from the South to the North - in case solar and wind power plants generate[15] - and from the North to the South (in case they do not generate due to lack of sunshine or windlessness). Current transmission grids are simply not constructed to deal with such high cross-border electricity flows and would have to be significantly modified in order to cope with them. Such high capital investments (capex) into the grids – combined with already high planned capex needed for refurbishment of the aging European electricity grids and their modification due to the changing electricity mix and electricity generation structure in Europe – would definitely pose problem of insufficient human (technicians and project engineers) and suppliers capacities.

Additionally, the transportation of such high quantities of electricity over high distances (even undersea) will lead to high electricity losses. Even the limitation of losses to 15 per cent thanks to using HVDC transmission lines/cables is extremely high compared to the electricity losses currently recorded by European Transmission System Operators.

Last but not least, there would have to be sufficient available capacities of ancillary services – predominantly changed legally required portion of the minute reserves and quick starts - to cover possible intermittent and unexpected cuts in electricity supplies from the solar or wind power plants in the DESERTEC system. For this purpose, the most appropriate are conventional power plants that could be easily and quickly started, especially power plants using natural gas. If not accompanied by further diversification of natural gas imports of Europe and sufficient natural gas strategic reserves to cover unexpected import cuts, this would pose additional threat to EU's energy security and thus denying the original goal of the whole project – strengthening the EU's energy security.

To facilitate transmission of huge electricity flows over long distances (due to dispersed and unequal special distribution of generation and consumption)

[15] According to some projections the total solar capacity installed in the DESERTEC project could climb up to 470 000 MW.

and in order to cope with the intermittent supplies of electricity generated from RES (depending on momentary natural conditions that could be predicted only with a certain probability), the EU is planning a construction of the so called *Super Grid*.[16] Super Grid – a system able to transmit dozens of GWs of electricity over thousands of kilometres - is supposed to be a new transcontinental grid interlinking solar and wind power plants in the MENA countries, the offshore wind power plants installed in the North and Baltic Sea, water pump storages in the Alps and in Scandinavia with European industrial and residential centres of consumptions. (see Tab. 2)

In fact, DESERTEC and Super Grid would be natural complements as Super Grid would help resolve some of the technical obstacles of the DESERTEC project. Installation and proper operation of such a grid[17] would facilitate utilization of the special distribution of RES on the territory of thousands of kilometres where partial counterbalancing of total fluctuations of natural conditions and hence balancing of the total generation take place.

To conclude this part of the feasibility study, the environmental aspects of the project should be added. One of the biggest objections leads to increased demand for water, respectively local freshwater supplies, in terms of cleaning and cooling turbines, which may have further negative impact on drinking water supplies for local population and industry. Another objection worth mentioning arises from the fact that the Earth's deserts act to cool the planet by reflecting heat energy, and if they are instead covered with heat-absorbing installations there may be a contribution to global warming. (Rhodes, 2010)

[16] The first moves towards a whole-European Super Grid were started in March 2010 in London by a group of 10 leading European companies - *The Friends of the Super-grid group* - (among others Siemens and Hochtief of Germany, Areva of France, Mainstream Renewable Power of Ireland and Prysmian of Italy) planning to construct an electricity "super-grid" in the North Sea (connecting the UK, Germany and Norway) will be launched in London on Monday, with expected costs reaching €34bn. (Crook, 2010)¨.

[17] We have to bear in mind that the Super Grid is going to face simile technical and financial obstacles as the DESERTEC. Yet, its support by the EU institutions (even the financial one) is more probable.

4.2.3 Economic Feasibility

The expected – or at least for now published – cost of the project are estimated to reach €400 billion, €350 billion out of it should be used for the installation of the whole system of solar and wind power plants and the remaining €50 billion should cover the necessary investments into the transmission grids. Yet, as some critics of the project claim – especially Dr **Scheer** – these costs are artificially down rated, while on the same time the possibilities to save costs when building the HVDC transmission lines are highly overestimated. (Scheer, 2009)

Despite the proclaimed support of the project especially in Germany (both by the political elites and energy companies forming the core of the DESERTEC Industrial Initiative), but also from the French President Nicolas Sarkozy or the President of the European Commission **José Manuel Barroso**, neither the German government, nor the EU is willing to promise substantial funding of the project. The EU Commissioner for Energy **Günther Oettinger** – one of the proponents of the project on the EU level – stated at the meeting with the ministers of energy from African countries on 20 June 2010 in Algeria that EU was ready to support the project on various levels. He suggested aiding with the coordination of the shareholders in the consortium, modification of legislation facilitating the flow of energy between the EU countries, or financing of the feasibility studies of concrete partial projects. Yet, when it comes to direct financial support from the EU budget or the change of rules for granting state aid – which would enable the EU Member States to grant state aid to companies involved in the project – Oettinger was less eager to any commitments. Detailed investment plan of the consortium must be presented first. (*EurActiv.cz*, 22 June 2010)

Hence, the total support promised up till now does not exceed €1-2 billion. That is why the TREC and DESERTEC Industrial Initiative representatives undertake a worldwide "road show" promoting the project and raising money for its realisation. The hopes are to gain funding from the rich Gulf countries.

Another snag in the project funding represent additional cost of the project caused by the guaranteed price for green energy, e.g. subsidies to the producers of electricity from solar or wind power plants that are essential for attracting investors. In the EU member states these are not uniform and can

have different forms, such as feed-in tariffs, premium systems, green certificates, tax exemptions and obligations on fuel suppliers. Despite the latest revitalisation[18] of the calls for harmonization of the redemption price for electricity from RES on the EU level - mainly by the Energy Commissioner **Günther Oettinger**[19] – harmonised or even unified system of EU green energy subsidies seems currently unfeasible.

In case of power plants installed in the Northern Africa, these "green" bonuses would have to be additionally increased for the risk bonus of the region. Besides the total amount of costs of these bonuses, it is unclear who would pay them. Currently, subsidies for green energy are paid (by end customers) always within the country where the electricity was generated and there are only very few signals that this approach could change. It is absolutely unthinkable that the green bonuses (for electricity exported to Europe) would be paid by citizens of the Northern African states. Yet, on the other side, without warranty of stable buy-out prices of electricity generated by DESERTEC facilities for many years ahead the project as such would be absolutely not feasible.

5 Conclusions

The DESERTEC project presented in this paper has already experienced both its ups (periods of higher political support and intensified media coverage) and downs (periods of scepticism or even dismissal by political and/or technical elites combined with negligence of the media) over its relatively short history. Currently it seems that it is experiencing at least political and media revival. This may be due to the intensified EU fight against climate change, the failure of the Copenhagen Post-Kyoto summit and also due to the adoption of binding rules

[18] European Commission conveys on a regular basis studies on the possibility of harmonisation of national subsidy schemes for green energy with the aim of removing the barriers for national production. However, the 2008 report concluded that the harmonisation would lead to market distortion as national subvention schemes had been already adopted and all that is needed is their proper and effective functioning. (Oettinger: OZE potřebují jednotné výkupní ceny, 2010).

[19] According to the Commissioner Oettinger huge potential for green energy generation lies in Southern Europe and the Northern Africa (the MENA region covered by the DESERTEC project). Yet, if the solar power plant were to be integrated into the European market with electricity, he is fully aware of the need to build up new infrastructure between Morocco, Spain, France, Tunis, Italy and Germany. Hence, European-wide guarantee and European-wide prices of green energy are needed in Europe in order to gain sufficient level of investments into RES and transmission infrastructure. (Oettinger: OZE potřebují jednotné výkupní ceny, 2010).

for the RES share in national energy mixes of EU Member States by 2020. Yet, despite this intensified political interest in the project and (political) support granted by the EU Commissioner for Energy Günther Oettinger and consequent higher media attractiveness, the future of the project remains doubtful.

The analysis of the three key aspects of the DESERTEC project feasibility- namely geopolitical, technical and economical – concluded in this paper has confirmed the initial hypothesis of the paper, e.g. the EU's strategy towards Africa is visionary, yet too difficult and too expensive to materialize. Plus, the overall feasibility and viability of the DESERTEC is closely interlinked or rather conditioned by the realisation and proper operation of yet another equally ambitious and technically and financially challenging project - the Super Grid - on the European continent.

Already disposable technologies enabling installation of solar panels directly in Europe combined with the installation of offshore wind parks in the North and Baltic Seas, with prospective and more effective use of other RES (tidal and geothermal energy, biomass, etc.) and accompanied by energy savings (arising from the increased energy efficiency of the European industry and housing) would provide for a more effective, more feasible and cheaper alternative to the DESERTEC project.

Nevertheless, the EU should not resign on its energy policy towards Africa. It should continue mitigating Africa's energy poverty, building up energy infrastructure (both on the African continent but also between Africa and Europe) and promoting environmental friendly generation technologies and sustainable development. At the same time, it is vital for the EU to preserve its footprint on the continent in the global strive for Africa's fossil fuels reserves and further develop facilities and infrastructure enabling LNG exports to EU.

References:

ANDOURA, S. – HANCHER, L. – VAN DER WOUDE, M. 2010. *Towards a European Energy Community: A Policy Proposal.* [online] Notre Europe. Studies & Research 76, March 2010. [cit.1.6.2010] Available at: http://www.notre-europe.eu/uploads/tx_publication/Etud76-Energy-en.pdf

BAHGAD, G. 2006 "Europe's Energy Security: Challenges and Opportunities." *International Affaires*, Vol. 82, Issue 5, p. 965, In: SKINNER, R. and ARNOTT, R. *EUROGULF: an EU-GCC dialogue for energy stability and sustainability.* [cit. 4.6.2005] Available at: http://Europa.eu.int/comm/energy/index_en.html,
BUZZAN, B. - WÆVER, O. - DE WILDE, J. 1998. *Security: New Framework for Analysis.* Lynne Rienner Publishers, London, 1998, ISBN-13: 978-1555877842
Commission Green Paper of 29 November 2000 Towards a European strategy for the security of energy supply. 2000. [COM(2000) 769 final - Not published in the Official Journal];
Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee of 12 October 2005 - EU Strategy for Europe: Towards a Euro-African pact to accelerate Africa's development. 2005.[COM(2005) 489 final – Not published in the Official Journal].
Communication from the Commission to the European Parliament and the Council - From Cairo to Lisbon – The EU-Africa Strategic Partnership. 2007. [COM(2007) 357 final **–** Not published in the Official Journal].
CROOKS, E. 2010. Energy groups to launch plan for European 'super-grid' [online] *FT.com (The Financial Times)*, [cit.10.3.2010] Available at: http://www.ft.com/cms/s/0/b686ad54-2a15-11df-b940-00144feabdc0.html?nclick_check=1
DESERTEC FOUNDATION. 2009. *Clean Power from Deserts. The DESERTEC Concept for Energy, Water and Climate Security.* WhiteBook, 4th Edition. Bonn, February 2009, ISBN: 978-3-929118-67-4
Desertec: African solar power for Europe, *UPI.com*, [online], [cit. 25.5.2010], Available at: http://www.upi.com/Science_News/Resource-Wars/2009/07/17/Desertec-African-solar-power-for-Europe/UPI-18021247870250/
Energetický projekt Desertec. Elektřina by ze Sahary mohla začít proudit už za pět let. 2010. EurActiv.cz, [Publisher: 22.6.2010], [cit.13.6.2010] Available at: http://www.euractiv.cz/energetika/clanek/elektrina-by-ze-sahary-mohla-zacit-proudit-uz-za-pet-let-007645

EUROPEAN CLIMATE FOUNDATION (ECF). 2010. *Roadmap 2050. A Practical Guide to a Prosperous, Low-Carbon Europe (Volume 1 - Technical and Economic Analysis)*, [online], April 2010, [cit. 13.7.2010], Available at: http://www.roadmap2050.eu/attachments/files/Volume1_fullreport_PressPack.pdf

EU Strategy for Africa**,** © *Europa* (official web page of the European Commission) [online], [cit. 24.5.2010], Available at: http://europa.eu/legislation_summaries/development/african_caribbean_pacific_states/r12540_en.htm

Evropa je o krok blíže energii ze Sahary. 2009. *EurActiv.cz*, [22.6.2009], [cit. 25.5.2010], Available at: http://www.euractiv.cz/energetika/clanek/evropa-je-o-krok-blize-energii-ze-sahary-006308

From a strategy for Africa to an EU-Africa strategic partnership. 2008. [online] [16.5. 2008], [cit. 24.5.2010], Available at: http://europa.eu/legislation_summaries/development/african_caribbean_pacific_states/r13009_en.htm

KNIES, G. 2008. *A brief overview on Global Energy, Water and Carrying Capacity Perspectives*. In. Clean Power from Deserts. The DESERTEC Concept for Energy, Water and Climate Security. WhiteBook

KOVAČOVSKÁ, L. 2007. European Unions Energy (In)security – Dependence on Russia. *Obrana a strategie*, 2007, roč. 7, č. 2, s. 5–21. ISSN 1214-6463.

KVÁČA, V. – KNOTKOVÁ, V. – KOCHAN, J. 2009. *Ropné zásoby v subsaharské Africe.* Brno: Tribun EU, 2009, 1. vyd., ISBN 978-80-7399-870-7

MANDIL, C. 2003. *The International Energy Agency and Africa. International Energy Agency,* [online], [cit. 30.5.2010], Available at: http://www.iea.org/papers/2003/african_energy.pdf

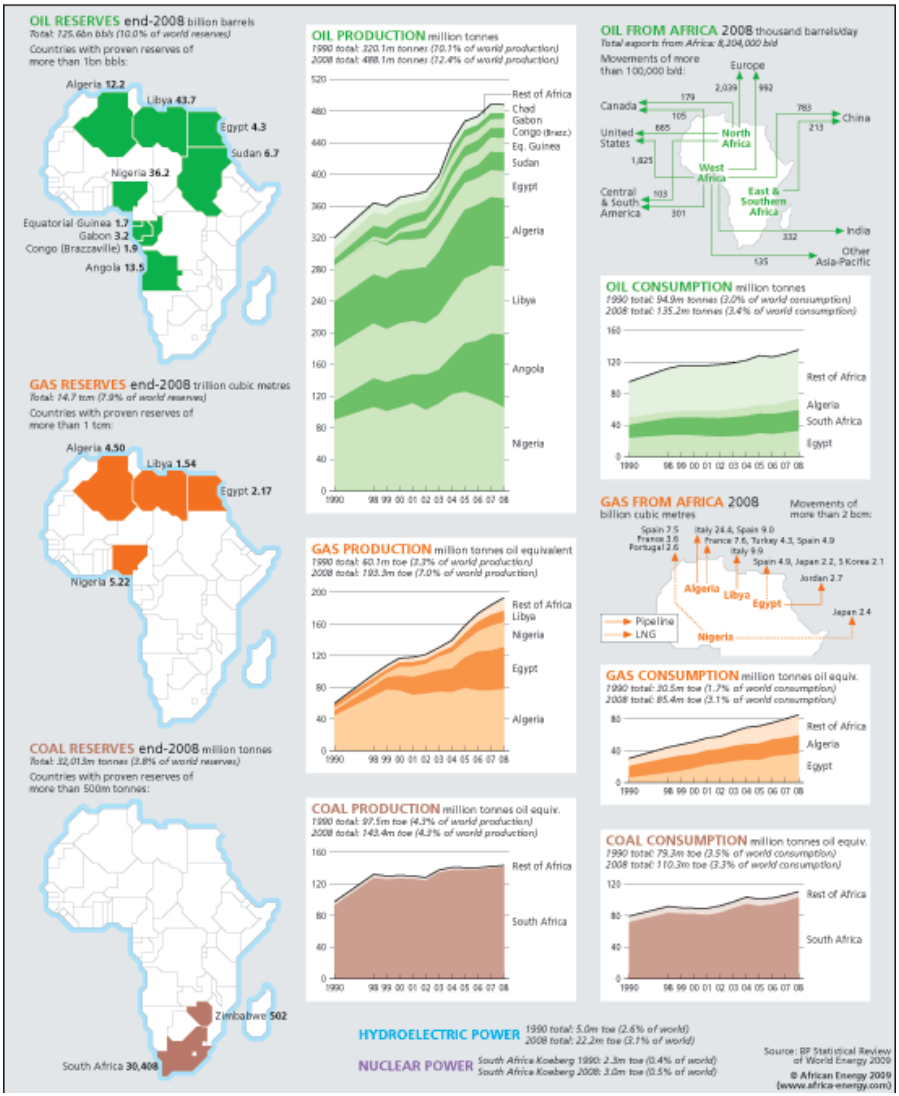
Největší solární projekt Desertec nabírá dech. 2010. *EurActiv.cz*, [23.2.2010], [cit. 25.5.2010], Available at: http://www.euractiv.cz/energetika/clanek/nejvetsi-solarni-projekt-nabira-dech-007126

Oettinger: OZE potřebují jednotné výkupní ceny. 2010. *EurActiv.cz*, [9.7. 2010], [10.7. 2010] Available at: http://www.euractiv.cz/energetika/clanek/oettinger-oze-potrebuji-jednotne-vykupni-ceny-007705

PRIBITZER, H. *Towards a European Energy Community for the 21st Century?* [online] European Parliament – Relations with National Parliaments., [cit. 16.6. 2010], Available at:
http://www.europarl.europa.eu/webnp/webdav/site/myjahiasite/users/emartinezdealosmoner/public/JPM%20WG%20I%20EN.doc
RHODES, CH. 2010. Desertec: Energy From The Sahara To Europe. [online] *Forbes.com* [30.6.2010], [cit. 13.7. 2010], Available at:
http://blogs.forbes.com/energysource/2010/06/30/desertec-energy-from-the-sahara-to-europe/
SHEIKH, F. 2009. Major Powers Scramble for Energy Security in Africa's Resources. [online] *The Market Oracle*. December 14, 2009, Originally written for OilPrice.com, [cit. 30.5.2010], Available at:
http://www.marketoracle.co.uk/Article15796.html
SCHEER, H. 2009. *European power from the desert is a Fata Morgana*, Press release, Bonn, [13.7.2009], [cit. 25.5.2010]. Available at:
http://www.hermannscheer.de/en/index.php?option=com_content&task=view&id=256&Itemid=10
TERRIF, T.- DRIFT, S. - JAMES, L. - MORGAN, P.M. 2000. *Security Studies Today.* Polity Press, Cambridge, 2000, ISBN-13: 978-0745617732
The Africa-EU Strategic Partnership. A Joint Africa-EU Strategy 2007. Council of the European Union, Lisbon, 9.12.2007, 16344/07 (Presse 291)
Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community (2007), signed at Lisbon, 13.122007
WIJKMAN, A. 2008. *We have to move fast towards Solar Energy*. In. Clean Power from Deserts. The DESERTEC Concept for Energy, Water and Climate Security. WhiteBook

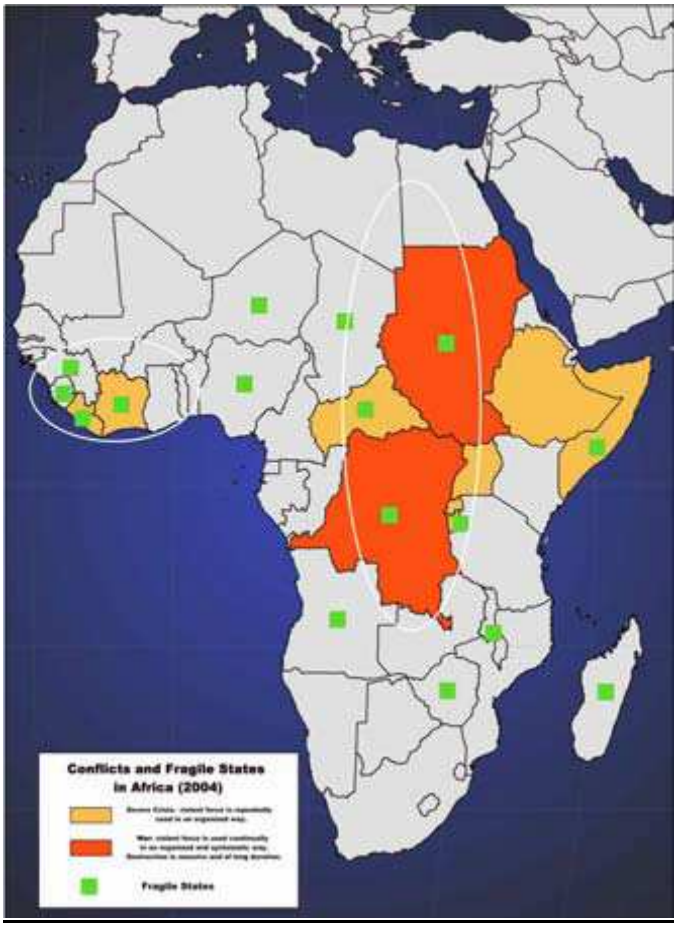
Appendices:

App. 1: African Energy: Reserves, production, consumption and exports



Source: www.africa-energy.com [online], available at: http://www.africa-energy.com/html/Public/map_library/continental/HC_supply_and_demand_08.html [quoted on: 2010-05-30]

App. 2: Conflicts and State Fragility in Africa (2000-2005)



Source: Heidelberg Institute Annual Report 2004 and the World Bank's LICUS (Low Income Countries Under Stress) Initiative (2004) In: Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee of 12 October 2005 - EU Strategy for Europe: Towards a Euro-African pact to accelerate Africa's development [COM(2005) 489 final – Not published in the Official Journal], p. 11