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Zefi Dimadama, Gulshan Pashayeva, Gulmira Rzayeva,
Charalambos Pippas, Theodoros G.R. Tsakiris, Ramiz Rahmanov,
Dimitris Papastefanakis, Christos Nychtis

Hellenic-Azeri Green Energy Forum

Energy cooperation and environmental
protection in the wider black sea area



2011-2012

The **International Centre for Black Sea Studies (ICBSS)** was founded in 1998 as a not-for-profit organisation under Greek law. It has since fulfilled a dual function: on the one hand, it is an independent research and training institution focusing on the Black Sea region. On the other hand, it is a related body of the Organisation of the Black Sea Economic Cooperation (BSEC) and in this capacity serves as its acknowledged think-tank. Thus the ICBSS is a uniquely positioned independent expert on the Black Sea area and its regional cooperation dynamics. Moving towards a “Green Black Sea” is our new perspective, one characterised by a focus on development, culture, as well as economic and social prosperity, one that goes beyond the traditional approach and makes the concept of Sustainable Economic Development, Energy, Regional Governance and Stability our driving force. Thus, the environmental dimension runs through all of our actions and aims.

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International Centre for Black Sea Studies (ICBSS)

4 Xenophontos Str.
10557 Athens
Greece
Tel: +30 210 324 2321
Fax: +30 210 324 2244
Email: icbss@icbss.org
Website: www.icbss.org

Director General: Dr. Zefi Dimadama

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Preface

This latest Xenophon Paper Special Edition emanates from one of International Centre for Black Sea Studies' (ICBSS) most important bilateral synergies, which has underlined the importance of the Center's role as a mutually advantageous framework for the synthesis of ideas, the composition of policy proposals and the facilitation of scientific exchanges at the highest level. The paper at hand is the scientific offspring of a joint programme developed by the International Centre for Black Sea Studies (ICBSS) and the Center for Strategic Studies under the President of Azerbaijan (SAM) that underlined the significance of this joint Hellenic-Azeri Green Energy Forum.

The Forum aiming is at promoting the two countries as partners in dialogue for beneficial cooperation in the field of Green Energy Development, and to build up sustainable structures and networks for furthering energy collaboration within the wider Black Sea area and in particular the issue of Azeri gas exports to and through the BSEC region. The Black Sea area constitutes a valuable natural asset of global importance vulnerable to human interventions that unfortunately, has to deal with severe environmental threats and future risks.

The two roundtables held respectively in Baku, on "Climate Change and Renewable Energy Resources in the wider Black Sea area" (July 2011), and Athens, on "Energy Cooperation and Environmental Protection in the Wider Black Sea area" (November 2011), both organised within the framework of the "Hellenic-Azerbaijani Green Energy Forum", brought together a variety of senior policy makers, private entrepreneurs, CEOs of state energy companies and acclaimed scientists who exchanged valuable information and good practices in an effort to raise awareness and to mobilise all relative parties with a view to promoting regional cooperation.

The results of these exchanges, some of which are detailed in the chapter of this collective paper, were very fruitful and constitute the basis of future and closer cooperation that is illustrated by the MoU ICBSS and SAM signed in Athens following the end of the second roundtable.

The goal of the two seminars and intellectually provoking debate that followed was to establish a clean energy policy model that would balance between the utilization of natural gas, the cleanest of hydrocarbon, and the aggressive promotion of Renewable Energy Sources.

We believe that such a balance lies at the hart of an eco-friendly policy programme applicable to the wider Black Sea area which could be expanded to other BSEC member-states and influence the organization's overall policy agenda. We both believe that the continuation of our cooperation would prove beneficial to BSEC policy makers, as well as the governments of Azerbaijan and Greece.

Dr. Zefi Dimadama & Dr. Gulshan Pashayeva
Athens, 2011-2012

Chapter 1

Climate change and black sea environment: greening energy policies

Dr. Zefi Dimadama, Director General of the International Centre for Black Sea Studies (ICBSS)

1. Black Sea environment: the state of the art

General features of natural environment

The Black Sea Region, as it is defined in the statute of the BSEC organization, includes countries connecting two different continents: Europe and Asia. The area is a crossroad of political, economic and societal cultures. In the present, it plays the role of an economic, geo-political and trade hub, while serving as a crucial oil & gas transportation corridor between Europe, Central Asia, and the Middle East. The Black Sea region is characterised by extreme regional discrepancies and a number of problems and challenges such as migration, “frozen” conflicts, environmental degradation, and illegal trafficking.

Nevertheless, the Black Sea area constitutes a valuable natural asset of global importance. Its natural habitats, ecosystems and diversity of species of fauna and flora are particularly rich, but at the same time vulnerable to human interventions. Its natural ecosystems include rich forests (mainly in the West, South and East), steppes (in the North), high mountains (in the East, South and the Carpathians) and many wetlands, which provide shelter for numerous species of animals and plants.

Apart from the maintenance of biodiversity, the area’s natural environment is crucial for the provision of goods for humans and their economic viability. Local populations are dependent on rivers for the supply of freshwater for consumption, industrial and agricultural uses. Forests provide a wide range of food, fuel and timber products, while fishery constitutes an inextricable part of the area’s economy and nutrition. Furthermore, the natural beauty of the Black Sea is a pole of attraction for tourists and therefore for new investments in the specific sector.

However, the environmental equilibrium of the Black Sea region is threatened by a series of challenges that have already started degrading the area’s features. The following section analyses the pressures on the natural environment and the direct or indirect impacts from human interventions on the area.

Pressures and threats

Even though the Black Sea did not follow the urbanisation and industrialisation patterns of other parts of Europe, which led to rapid environmental degradation, it still has to deal with severe environmental threats and future risks. These can be categorized into three basic types:

- a) Water resources and management
- b) Coastal areas, forests and inland ecosystems
- c) Natural and technical risks

The pressures and threats of these three types will not be analysed at this point, since the paper focuses on the environmental pressures stemming from the sector of energy and climate change.

Energy sector and climate change

Energy production and consumption are the main contributors to the generation of greenhouse gas emissions and other air pollutants, oil and nuclear waste. The energy sector constitutes the backbone of economy for the countries of Black Sea, concerning either production or transportation, and therefore environmental impacts in the area are more evident than anywhere else. In the case of Azerbaijan which is the largest, after Russia, BSEC energy producer/exporter, more than 97% of all Green House Gasses (GHG) are generated by the energy sector.¹

Oil industry installations are major sources of solid, liquid and gaseous waste to air, soil and water². The improper extraction of oil is responsible for the destruction of natural habitats for animals and plants, even though the history of post-Soviet Azeri oil development has exhibited a remarkable sensibility and sensitivity in the environmental protection of the Caspian habitat. It is notable that despite the more than tripling of Azeri oil production since independence there has been no major oil spill on the Azeri sector of the Caspian Sea, where the country's nearly entire oil production is located.

The fact that Azerbaijan's Caspian waters have so far remained safe from a Macondo-type catastrophe should be a source of pride for Azerbaijan and its international partners but it should also remain a concern of paramount importance and incessant vigilance on the part of the appropriate authorities. This is equally important not only for Azerbaijan but also for the entire BSEC region. The recent tragic events concerning the Macondo oil spill accident in the Gulf of Mexico have changed "the rules of the game" in offshore oil & gas exploration all over the world. The European Commission is examining ways of establishing more strict safety measures while other E.U. member-states, such as Italy and Denmark, are in the process of undergoing a similar re-evaluation process.

Given the geography of the greater Black Sea region a Macondo-size event could have far more serious and devastating implications for what is a relatively closed and non-oceanic maritime environment. This geographic reality seems to have escaped the attention of nations engaged in offshore oil & gas exploration in both the BSEC & Mediterranean areas. This process may be developed –as it should- along national lines but a certain level of coordination between the littoral states is more than necessary and should lead towards a joint prevention and crisis management plan for the Mediterranean and Black Sea regions.

The European Commission has taken the lead in proposing a detailed plan that would streamline and synchronize the national response mechanisms of all littoral states so that a potential oil spill

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¹ Statistical Yearbook of Azerbaijan 2008

² Greening Black Sea Synergy (see footnote 1).

could be contained before it spreads beyond the territorial waters of the nation which is affected first. This is an issue that concerns BSEC as well.

A regional response-management mechanism is of particular importance given Turkey's expanding oil & gas exploration activities along its Black Sea Coast that is closely followed by parallel developments on the Georgian, Russian, Ukrainian, Bulgarian and Romanian Exclusive Economic Zones. Azerbaijan's experience in leading such a debate within BSEC would prove extremely valuable for its regional partners. Moreover SOCAR and the IOCs (International Oil Companies) engaged in the development of Azeri hydrocarbons have implemented a systematic programme of ecological and industrial rehabilitation from the near catastrophic degradation of the country's oil management system under the Soviet centralized system.

Baku and its suburbs have been completely transformed from both an environmental and urban planning point of view to a modern city that looks with certitude and ambition into the 21st century. This continued environmental rehabilitation is of course a constant fight that requires an ever greater vigilance as Azerbaijan is dynamically emerging as one of the world's most important oil & gas exporters outside OPEC. We must not forget that waste products can also cause soil contamination, if they are not properly treated and disposed³.

On the other hand, oil spills from accidents during the transportation of crude oil and oil products can cause serious environmental damage, as we are constantly being reminded of every time we cross the Bosphorus Straits. This is also a significant concern for Azerbaijan as the volume of cross-Caspian tanker traffic from Kazakhstan and Turkmenistan is estimated to increase exponentially over this decade. The Black Sea countries have a tradition in nuclear energy production. However, this tradition is not always accompanied with the necessary safety standards for nuclear power plants, which remain a serious potential source of hazard.⁴

Even after Chernobyl's nuclear accident that cost lives and irreparable damages in the area's environment and economy, there are still a series of soviet-build nuclear reactors in several BSEC countries (Romania, Bulgaria, Russia, Ukraine, and Armenia) that remain important for the sustainability of their respective electricity production. Moreover Turkey is already engaged in an ambitious nuclear programme of its own that aspires to cover up to 5% of its 2020 electricity needs, while other BSEC states such as Albania are also considering the introduction of nuclear power in their electricity mix. What is lacking though –especially after the Fukushima accident– is the implementation of a strict set of EU-level rules that will streamline not only existing crisis-response mechanisms but also coordinate the conduct and evaluation of regular stress-tests in the nuclear plants of all BSEC countries.

It is already evident that climate change, and particularly rising temperatures, is having a significant impact on physical, biological and human systems. Warmer temperatures are causing changes in the hydrological cycle and they affect the incidence and severity of drought and floods and the availability of water, threatening in many aspects human society and industry (e.g. agriculture, rural economies, water security and food security). Sea level rise is another consequence of climate change that will have an increasing impact on human settlements and infrastructure. Azerbaijan

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³ European Environment Agency, Europe's Environment: The Fourth Assessment, Copenhagen, 2007, http://www.eea.europa.eu/publications/state_of_environment_report_2007_1 (accessed October 7, 2010).

⁴ Greening Black Sea Synergy (see footnote 1).

and its energy industry infrastructure would be especially vulnerable to such an eventuality given the fact that the country and most of its economy practically “live on the sea”.

The Black Sea area is particularly susceptible to this kind of changes, and it is possible to experience floods, droughts, sea level rise, shortage of freshwater and degradation of agricultural products. Furthermore, local populations are likely to migrate due to severe economic and environmental impacts provoked by climate change. Species migration is also a probability, since climate change influences severely biophysical systems. Climate change can also negatively affect the tourist industry in coastal areas, especially in the Black Sea countries that lack adequate national or regional contingency plans. Agriculture is also a vulnerable sector that can easily be afflicted by global warming, prolonged droughts, intense floods and shrinkage of fertile land. Some of the most serious environmental pressures and threats are presented in the following box:

Box 1: Environmental pressures and threats from energy use and climate change

- ✓ Generation of greenhouse gas emissions and other air pollutants from the dominant energy production model based on fossil fuel
- ✓ Insufficient Development of renewable energy sources particularly as a substitute for Thermal-Power Plants based on coal and natural gas as well as the extensive use of nuclear power esp. among former Soviet States
- ✓ Insufficient Development of energy conservation and efficiency programmes that would limit the CO₂ footprint of the oil & gas industry while extending the commercial life of existing hydrocarbon resources
- ✓ Potential Leakage and waste production (solid, liquid and gaseous) from the production oil and gas industry
- ✓ Absence of a BSEC wide crisis-response mechanism in case of a major Oil spill accident in the Black Sea
- ✓ Continued Dependence on Nuclear Power Plants and lack of an integrated stress-test response mechanism for the non-EU BSEC member states.
- ✓ Potential of drought, floods, availability of water due to warmer temperatures (affecting agriculture and rural economies)
- ✓ Possibility of sea level rise, migration of species
- ✓ Negative impacts on tourist industry, urban environment, coastal zones

2. Institutions and actors

Numerous organisations, institutions and networks are today active in the region of Black Sea, aiming at the cooperation of countries and the coordination of their actions. These initiatives differ concerning the space and scale of reference, the institutional membership (international, regional, European) and the initiatives and power relations of the different actors involved. So, here are international organizations and forums (e.g. the Black Sea Commission on the Protection of the Black Sea Against Pollution – 1992), regional organizations and platforms (such as the Black Sea Economic Cooperation – 1992) and EU driven policies and programmes (e.g. Black Sea Synergy – 2007).

Despite the plethora of various institutions and structures in the Black Sea area, it seems that there is a lack of political commitment, which influences negatively policy making procedures and national or regional cooperation. For example, one of the most important intergovernmental organisations in the area is the Black Sea Commission that was established in the Bucharest Convention in 1992 and it constitutes the only official initiative for the environmental protection and regional cooperation of the Black Sea. The Commission's protocol on biodiversity and landscape conservation is not yet implemented, since only two countries (Turkey and Ukraine) have ratified it⁵. This case shows the lack of political will from national governments to proceed to effective communication and coordination. Simultaneously, in the absence of clear goals, the multiplicity of organisations, bilateral agreements, and institutions lead to a highly fragmented system⁶ with misplaced priorities and misused funds. Consequently, the numerous institutions and actors have not led until now to cohesion and synergy of actions, rather than overlapping and lack of clarity and coordination.

In this framework, scientific and political debates agree on the need for a strengthened, more effective, and more coherent institutional and legislative framework for international and regional cooperation and environmental governance⁷. To this end, the participation of the EU in certain organisations and conventions would act as a driving force in improving the legislative framework, promoting its operationalisation and enhancing cooperation among the Black Sea states. In fact, Greece, Bulgaria and Romania, already EU member states, can promote the EU agenda to the other countries and play a crucial role in cooperation structures.

3. Policy recommendations for integration of actions for “greening” energy policies

Effective environmental protection requires the consideration of environmental impacts of all sectoral policies at the national level. The need for a more holistic approach leads to a cross-

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⁵ Greening the Black Sea Synergy (see footnote 1).

⁶ James Gustave ‘Gus’ Speth, Analyzing the Present, Report from the Global Environmental Governance Forum: Reflecting on the Past, Moving into the Future, June 28 – July 2, 2009, Glion Switzerland, http://www.unep.org/civil_society/GCSF11/pdfs/GEG-Forum-Report_Final.pdf (accessed October 11, 2010).

⁷ Maria Ivanova and Jennifer Roy, The Architecture of Global Environmental Governance: Pros and Cons of Multiplicity, January 2007, www.centerforunreform.org/system/files/Ivanova+and+Roy+GEG.pdf, (accessed October 12, 2010)

sectoral policy integration, as a means to “green” all economic activities already at the planning stage. The real challenge lies in the determination of environmental externalities deriving from development activities⁸. In addition, it should be noted that until today there is no formal environmental cooperation between the Black Sea countries. Despite the area’s unquestionable value in resources and biodiversity and the common challenges that they have to deal with, there are still no official commitments.

In this regard, the Working Group on Environmental Protection that was held in 2010, in the framework of the Black Sea Economic Cooperation (BSEC) Action Plan for Cooperation, with the participation of the International Centre for Black Sea Studies (ICBSS), as the Organisation’s acknowledged think tank in the field of environmental protection, concluded in the fact that little has been done regarding the implementation of the Action Plan. It is very important to underline that the 23rd Meeting of the Council of Ministers of Foreign Affairs of the Organization of the Black Sea Economic Cooperation (BSEC) on 26 November 2010 in Thessaloniki, adopted a “Joint Declaration on Combating Climate Change in the wider Black Sea area”

The declaration refers directly to crucial issues emerging in the Black Sea area, in relation to climate change. The Ministers of Foreign Affairs of all BSEC Member-states acknowledged the significance of regional cooperation as an important step against the negative impacts of climate change. With this Declaration all BSEC Member-states committed to develop the necessary policies to battle environmental degradation in the region.

The countries of the Black Sea region need to implement multilateral environmental agreements and establish a more strategic environmental cooperation in the area. In this framework, multi-scale cooperation could be implemented in issues such as waste management, pollution or biodiversity preservation. For example, fisheries in the Black Sea constitute a cross-boundary issue. The assessment and the data collection of these fisheries are crucial in order to explore new sustainable ways of using these resources and ensure their viability.

In the framework of ecological security, the Black Sea countries should adopt shared initiatives, concerning the implementation of tools of environmental risks assessment, especially early warning prediction models and scenarios about potential environmental hazards and improvement of disaster and crisis management. The notions of ecological security, monitoring, risk analysis, management and long-term safety for the Black Sea environment and populations should be embraced, in order to attain a gradual reliance on renewable energy resources.

New interventions are also needed in regional policy implementation. Incentives should be given for green, innovative development and new investments. This includes the greening of enterprises by the implementation of environmental management systems, such as the EU Eco-Management Audit Scheme (EMAS) or ISO 14001, which help companies and organisations to improve their environmental performance. The same pattern can be followed in the public sector, in organisations of local government or in Universities. “Green Municipalities” or “green Universities” clusters could further act as examples of “good” environmental governance.

The implementation of bilateral agreements among the Black Sea countries is the only way in order to coordinate actions towards a better balance of oil, gas and other alternative energy

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⁸ American Institute for Contemporary German Studies, Environmental Diplomacy, Washington D.C., November 18, 1998, <http://www.aicgs.org/documents/environmentaldiplomacy.pdf> (accessed October 12, 2010).

resources. Of course, this is a very difficult task to fulfill, given the high dependence of the Black Sea on fossil fuels. It is also imperative to take into account the complexity of international and changing interests among the EU, the Black Sea countries and the multi-national corporations, in order to have realistic policy recommendations in the energy sector.

The Black Sea countries should take full advantage of the opportunities offered by international and European agreements, protocols and legal frameworks. Greece, an EU member state since 1981, can share valuable knowledge and expertise in the same direction. The EU already offers valuable guidance towards this goal through several institutions, such as the European Neighbourhood Policy.

Nevertheless, this guidance does not constitute a clear integrated policy for the Black Sea countries, rather than scattered dimensions. Therefore, the EU should not address isolated thematic issues, but integrated environmental concerns into these cooperation fields. It should support cooperation actions around issues (e.g. climate change) that offer joint incentives and result in benefits to all parties, based on a thorough analysis of the regional political economy and the evolving global agenda⁹.

More actions should include the coordination with other regional institutions and organisations having as a common goal the environmental protection, the promotion of clean, environmentally friendly and resource saving technologies and the establishment of a monitoring mechanism ratified by all countries for the data collection and ongoing evaluation of the Black Sea environment. As it already known the promotion of Renewable Energy Sources into the electricity generation mix is a major means of combating climate change.

Already in Azerbaijan's case a significant component of its electricity comes from the utilization of its hydro-electrical potential that covers around 17% of its annual demand. Nevertheless there is great room for improvement especially in the area of wind energy production, where a series of studies indicate that Azerbaijan could have a wind generation capacity of up to 800MW concentrated around the Absheron peninsular potential.¹⁰

This year Greece increased its wind-energy production by a very significant margin and could offer its technical know-how and regulatory experience within the existing Energy Partnership parameters of bilateral cooperation. The penetration of wind-energy and more generally RES-produced electricity in the Azeri generation-mix does not merely mean less CO₂ emissions. It also means that larger quantities of natural gas could be "freed-up" for export to Europe thereby striking a proper balance between Azerbaijan's need to maintain security of energy demand while meeting its Kyoto obligations.

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⁹ Panagiota Manoli, *Reinvigorating Black Sea Cooperation: A Policy Discussion*, Policy Report III, Commission on the Black Sea, (Bertelsmann Stiftung, Gutersloh, 2010).

¹⁰ BSEC, *Energy View of BSEC Countries 2008*, (Athens: 2008), p.p.:138-142.

Box 2: Policy recommendations for integration of actions for “greening” sectoral policies

- ✓ Use of renewable energy policies and technologies for energy efficiency
- ✓ Holistic approach towards a cross-sectoral policy integration
- ✓ Reinforcement of the BSEC’s role for the enhancement of horizontal actions for the environment, the allocation of financial resources and the management of projects that need sufficient political and technical support
- ✓ Multilateral environmental agreements among Black Sea states for waste management, pollution, biodiversity preservation, fisheries, better balance of fossil fuels and alternative energy resources
- ✓ Implementation of environmental risks assessments, early warning prediction models, scenarios of potential environmental hazards and improvement of disaster and crisis management
- ✓ “Smart greening” of enterprises, public institutions, Universities and Municipalities by the implementation of environmental management systems (EMAS, ISO 14001) and environmentally friendly “clean” technologies
- ✓ Provision of experience and promotion of institutional setting by the EU member states (Greece, Bulgaria and Romania)
- ✓ Taking full advantage of opportunities originated from EU policies and institutions (e.g. ENP)
- ✓ Harmonisation of environmental legislation in Black Sea countries
- ✓ Ratification of monitoring mechanisms for data collection and ongoing evaluation of the Black Sea environment
- ✓ Enhancement of notions of legitimacy and efficiency
- ✓ Transparency and accountability of national, regional and local governments through strict independent evaluations

4. Conclusion

The environmental problems that were highlighted in this text are the proof that there is an imperative need for “greening” the Black Sea area. Experience and best practices so far have demonstrated that there is a way. The EU is a strong ally in this effort, since it could work with Black Sea countries in order to develop strategies for adoption. The EU could also develop policies and legal frameworks for environmental protection. International funding should be mobilised for this purpose, including international funding mechanisms (e.g. Kyoto mechanism)¹¹. Apart from the European aid, the Black Sea area already has institutions to rely on, such as the Black Sea Economic Cooperation. The BSEC needs to be strengthened and in some cases adapted, with a view to enhance cooperation among counties and better address the challenges of environmental governance and sustainability in the Black Sea area. Black Sea countries are diverse economically and environmentally, they have different aspirations, and are not able or willing to move at the same pace¹².

However, they still share positive legacies and they can converge to some key priorities. Legal compliance is essential, along with administrative and technical support of the relative departments and agencies and building of needed capacities. Implementation processes should be accompanied with the appropriate planning, financing and monitoring mechanisms, in order to achieve the environmental objectives. The empowerment of environmental authorities, NGOs, civil society and other stakeholders would also support environmental reforms.

Corporations and industrial interests should be taken into serious consideration in the effort of finding common ground with environmental needs. On the other hand, polluters should be given incentives to improve their environmental performance, save on energy and implement various efficiency programmes that would be beneficial to the energy industry itself such as limiting gas flaring while training themselves to think and act “green”.

Environmental financing should be integrated into public expenditure frameworks, while any new possible sources of financing should be exploited (for example the Clean Development Mechanism defined in the Kyoto Protocol)¹³. Environmental governance can be a vehicle to cope with the negative impacts of climate change, overcoming inefficiency and fragmentation, leading towards a more balanced energy security model, based on the new vision of “greening” the Black Sea Area.

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¹¹ Greening Black Sea Synergy, (see footnote 1).

¹² Policies for a Better Environment, Progress in Eastern Europe, Caucasus and Central Asia.

¹³ Ibid.

Chapter 2

Energy security from the perspective of Azerbaijan: Gaining access to downstream markets in Europe

Ms. Gulmira Rzayeva, Research Fellow, SAM Centre for Strategic Studies under the President of the Republic of Azerbaijan

Azerbaijan aims to become a significant presence in the European gas market after 2017 when Shah Deniz Phase Two will come on stream. The country's target is to have access to multiple buyers, multiple pipelines, and multiple transportation routes not only in the greater Southern Caucasus region but also in the European markets. Azerbaijan wants to be important for the EU as an energy supplier state but in a manner which is consistent with the gradual adoption of EU internal energy principles.

Azerbaijan is keen to promote Europe's Eastern Partnership, which, among other things, rightly seeks to encourage the emergence of open and transparent markets. In any case who knows what EU membership would look like by 2030 (adding a few solvent countries with rapidly growing economies might not be a bad thing). So, the Azerbaijani state oil company, SOCAR, seeks to create reliable, trustworthy and solid access to the World's most lucrative, legally regulated, stable, commercially reliable gas market - namely Europe with its 500 million consumers.

With 10 billion cubic meters per annum (bcm/pa) of gas to deliver to the European market would it not be much more cost-effective for Azerbaijan to deliver its gas to the closest European markets via existing infrastructure, existing interconnectors through South East Europe (SEE) is hungry for gas, and such an arrangement would significantly improve the situation for those countries.

Life for many could be better without expensive and highly politicized pipelines. Thus BP's recent proposal of the "minimal new build" South East European Pipeline or SEEP meets all the requirements of the Shah Deniz stakeholders - it is to be welcomed and we should not be surprised if the stakeholders consider this option very seriously. History shows that if a commercial deal becomes too politicized, it also is likely to become less commercial. Future generations of Azerbaijanis are unlikely to congratulate us for making less money to put in the Azerbaijani State Oil Fund (SOFAZ).

Azerbaijan considers the security of its access to the markets of South East Europe as a very attractive prospect since there are strong historic and contemporary commercial reasons for reaching this area. Such access may be even more attractive than getting to Italy. Higher gas prices in the Italian market could be a temporary manifestation of monopolistic positions. In the future Italy may well diversify its energy supply sources as it moves to full implementation of the EU energy packages and a market based on the existence of a full open and transparent competition.

One of the principal energy security concerns for the countries of SEE is their almost complete

reliance on an old-fashioned monopolist supplier. Providing even a small level of diversity in their gas import sources could give some political leverage to Azerbaijan, for instance by giving additional prominence to the Azerbaijani standpoint in international fora as we recently witnessed with regards to the election of Azerbaijan as a non-permanent member of the United Nations Security Council.

The demand side

According to Borut Grgic, the founding director of the Trans Caspian project and a Balkan energy expert, South East Europe's energy infrastructure is ageing and in need of upgrades. The region's electricity generation capacity is still largely run on coal, interspersed with old hydro and nuclear power plants. This represents both an environmental concern and a security risk.

For example, in Albania, almost 100 percent of electricity is produced through hydro electric plants that are nearly 50 years old; severe droughts a few years ago resulted in a loss of more than one third of the country's power production. The Balkan states need new energy sources to limit their dependence on coal, hydro and nuclear power as they prepare for further economic growth and modernisation in order to bring their economies up to west European standards.

However given the regional monopolist's recent behaviour, these countries are unlikely to seek to increase their overall dependence on gas if this means increasing their reliance on Russia. The EU is rightly concerned, because all these countries are either already EU members, or are on their way to accession. Natural gas from Azerbaijan can thus address both the political and commercial requirements of these states and SEE as a whole.

Moreover at present the gas price in the region is 25 percent higher than the spot price in Austria. This is only possible because other forces are interfering in the free flow of energy throughout the region. When SEE buys nearly all its gas from only one supplier, namely Gazprom, while lacking a sufficient number of connections to alternative energy sources, it gives that supplier the power to set the price through long-term contracts.

In the Balkans, Gazprom sets the gas price, and also owns a lot of downstream assets in the region outright or through joint ventures, which ensures that it has the ability to intervene and block access to pipelines for third parties. Caspian natural gas is vital for the region. Deep reforms in the region's energy markets are also essential, and cannot be delayed any longer. Otherwise, the owners of the Azeri gas may be better served by-passing the Balkans and sending all of the 10 bcm of gas to Italy - even if that country were to enter a period of long term financial crisis.

Complex environment

Although Russia is rightly concerned about the effects of the ongoing European crisis on one of its main sources of national revenue, the crisis has also given Moscow an opportunity to take advantage of a diverse, democratic and (looking from the outside with a Soviet mindset) somewhat disorganised Europe. Clearly Russia would be wise to purchase assets in Europe while they are cheap. Moscow has already started looking at buying up firms throughout Europe that have been suffering during the crisis. The Kremlin is focused mainly on banks and energy firms, followed by

strategic assets like ports and airports. Although most of the deals are still in the consideration and negotiation stages, the Kremlin is thinking in the long term about the use of these assets.

There is no sense of reciprocity about these activities - access for investment by European companies in Russian markets and particularly in the upstream has not increased in recent years - arguably it has been reduced. It is also notable that Russia is not giving top priority to the greatest financial returns; it is giving top priority to those that would give Russia important tactical and strategic leverage in Europe, particularly in Central Europe. The Kremlin's aims are not a secret so these actions should not be a surprise to Europe, the question is what are «they» (Brussels and the national governments) going to do about it; if the aim of the EU energy liberalization package is to establish open and transparent market competition then such a goal is unlikely to be achieved by selling assets and strategic positions to the region's most powerful monopolist.

Shah Deniz 2 Selection Criteria

South East European markets are attractive for the Shah Deniz shareholders and Azerbaijan as a producer country is keen to penetrate the region after 2017 when Shah Deniz Phase Two will come on line. However it does not mean that it will happen at any expense and that all three rival proposals of the Southern Gas Corridor project – Nabucco, ITGI and TAP should not fulfil the shareholders' selection criteria. The decision will be made most probably by April 2012. The following principles will be used during the process for the selection of the export route:

1. Commerciality – based principally on full export chain value, including market prices and infrastructure access charges and tariffs.
2. Project deliverability – technical and organizational capability to execute the project plans on schedule and within budget
3. Financial deliverability – ability to cover development costs through equity, loans, grants or other funding
4. Engineering design – scope and quality of the engineering plans
5. Alignment and transparency – willingness to cooperate technically with Shah Deniz and to align with the timeline of Shah Deniz Final Financial Decision (FFD)
6. Operability – the long term capability to manage physical and commercial operations safely, efficiently and reliably
7. Scalability – the potential for expansion or addition of export facilities to allow transportation of increased volumes as further gas supplies become available
8. Public policy considerations – meeting the EC's state objective of enhancing supply diversity of European natural gas markets, and ensuring sustained support from all stakeholders.

Among others the most important criterion for the shareholders is the commerciality of the proposals. That said, the most commercially viable project should provide the maximum value chain for the producer, providing direct access to infrastructure and markets not merely on the evacuation route but also granting to shippers direct access to markets that are adjacent to the main evacuation route. It goes without saying that this access should be granted for reasonable charges and tariffs.

Another important criterion is the scalability of the project which means that the selected pipeline should be technically able to expand its capacity in order to transport more volumes of gas. This criterion is important because the Southern Gas Corridor will start with 10 bcm of gas from SD 2, but at a latter stage the development of smaller than Shah Deniz, Azeri offshore fields, like “Umid”, “Babek”, “Absheron”, “Nakhchivan”, “Asiman”, “Zafar-Mashal”, etc., will increase the exportable volumes to over 20 bcm/a. These new volumes will have to be transported via the pipeline project selected to service the needs of SD2.

Advantages and disadvantages of the projects

Each of the Nabucco, ITGI and TAP proposals have advantages and disadvantages, present strengths and weaknesses to the Shah Deniz co-ventures. This part of the paper will now summarize the comparative attractiveness of each project. The Nabucco project is the largest and most ambitious of the three proposals. It is designed as a “super-highway” to deliver large volumes of Caspian and Middle East to the heart of Europe. In a larger sense Azerbaijan, Turkmenistan, Kazakhstan, Egypt, and Iraq are all considered potential supply sources for Nabucco. However at this stage Shah Deniz gas is the only guaranteed source for this 31 bcm/y project.

The scale of the project means that costs are high. Nabucco’s price is estimated as €13 billion, which according to some speculations by Shah Deniz shareholders could be significantly underestimated. In any event, a large throughput commitment could put tariff low while still providing an economic return to pipeline investors. As such, in order for the project to be viable a second or even a third supplier is essential for making Nabucco bankable, as Baku cannot agree to start a 31 bcm capacity project with a commitment of merely 10 bcm since it will lessen the revenue and payback for gas.

Given the recent European Council decision (September 2011) to mandate the European Commission to negotiate with Azerbaijan and Turkmenistan the realization of a Trans Caspian Pipeline (TCP), it seems that a large scale TCP is the most advanced and realistic proposal among other options, which are designed to deliver Turkmen and in the future Kazakh gas to Europe. Apart from the political challenges, namely strong Russian and Iranian opposition that the TCP proposal faces there are also technical difficulties that the EU has not been considering while pursuing the project.

As of today none of the European or even Western companies has been involved in upstream projects in Turkmenistan. European companies don’t have direct access to Turkmen gas and even if the TCP was realized there would not be enough gas available to be delivered via that pipeline. Chinese companies, namely the CNPC (China National Petroleum Company), has instead vastly invested in upstream projects in Turkmenistan and the question is: “Would the Chinese be so generous to let the gas they extract to flow westward instead of eastward?” The answer is obviously “no”.

If the Europeans will start to invest in developing the fields in Turkmenistan today they will have this gas in place in minimum 10 years depending on the available technologies. That is gas reality. So the EU decision to have the infrastructure in place without first having prior access to the gas supplies seems to challenge the realization of the Trans-Caspian pipeline and thus the Nabucco project. This is the most serious political challenge Nabucco would have to face.

The Interconnector Turkey-Greece-Italy (ITGI) plans to build a relatively narrow diameter section of pipeline through Greece to Italy. ITGI is a far less ambitious project compared to Nabucco, and of all the projects it has the smallest scope. It aims to use gas exclusively from Shah Deniz 2.

The main advantage of the project is that it enjoys the strong political support of the Italian and Greek governments and that it is the most advanced in terms of submission of all the necessary documents including documents on third party exemptions, Intergovernmental Agreements (IGA), Project Support Agreements (PSA) etc. It also proposes to extend the pipeline to Bulgaria and potentially further to F.Y.R.O.M. and Romania.

However ITGI a joint project between Italy's Edison and DEPA, faces financial challenges and it is uncertain how DESFA will finance the 900km onshore section from Komotini to the Ionian coast of Thesprotia in a time which is very critical for Greece from a financial point of view. DESFA is the Greek national Transmission System Operator (TSO), which is a 100% owned subsidiary of DEPA.

DEPA is 65% owned by the Greek state and 35% controlled by Hellenic Petroleum. DESFA is entirely responsible for the Greek onshore section of ITGI. The severe budget deficit and sovereign debt crisis currently facing Greece could restrict the state's ability to finance the onshore section unless DESFA undergoes some form of privatization.

Furthermore ITGI does not answer the scalability criteria of the Shah Deniz shareholders, which require the potential or expansion of the capacity of the pipeline in the event additional gas volumes become available for transportation from other fields in offshore Azerbaijan. The onshore section of ITGI is 107 cm or 42 inches whose capacity could be technically possible to increase with additional compressors up to 16 billion cubic meters per annum (bcm/pa). The scalability of the offshore section known as Poseidon or IGI (Interconnector Greece Italy), a 207 km underwater pipeline owned equally by Italian private company Edison and Greece's DEPA, is even more difficult to achieve, as the size of the pipeline is 32 inches. Normal flows for this pipeline size would be some 10.5 bcm/y and with additional compressors this capacity could rise to a maximum of 12 bcm/pa.

The Trans Adriatic Pipeline or TAP, which also aims to deliver gas from Shah Deniz 2 to Italy via Greece and Albania, seems to be the most financially strong and viable project at this stage. Initial capacity of the pipeline is 10 bcm with the possibility of expansion up to 20 bcm/y. The involvement of Norway's Statoil and Germany's E.ON is of particular significance as both of them are rich and experienced onshore and offshore pipeline operators.

TAP is not an EU project as its main shareholders Statoil and EGL come from non-EU member states, Norway and Switzerland. Therefore it lacks the political support of the block and the EU would want to see the realization of a rather strategic and big pipeline which could significantly improve the security of supply for Europe such as Nabucco and not the construction of pipelines with smaller capacity such as TAP.

In addition, the intergovernmental agreement with Greece needs to be secured as it is uncertain if Greece will allow TAP a rival to its own proposal ITGI, to pass through its territory in the event if ITGI is not selected by Shah Deniz partners. The political tensions between Albania and Greece might also affect the decision of both countries to cooperate on TAP. Given the attractiveness of the South East European markets for Shah Deniz shareholders and Azerbaijan, TAP's proposal to extend the pipeline to the Western Balkans including Serbia, Bosnia and Croatia is an advantage of the project. However it needs to secure gas volume for those countries and clarify with SOCAR

if the latter is ready to provide an additional 3-4 bcm/pa for the Western Balkans besides the 10 bcm/pa that would flow to Italy.

Conclusion

So the scene is set for some extremely interesting decision making. It may look confusing at times but that is what open transparent markets are like - they can be regarded as a mechanism for balancing a wide range of actors and interests. In terms of historical perspective, Azerbaijan hopes sincerely that the solution for the export of Shah Deniz Phase 2 gas will be firmly based on the principles described by Adam Smith in the 18th century, rather than those deriving from the works of Karl Marx in the 19th.

Chapter 3

Greek policies on green energy development and infrastructure in the broader region

Mr. Charalambos Pippas, Director, Directorate for Public Relations & International Affairs, Secretariat General for Energy & Climate Change, Ministry for Environment, Energy & Climate Change

Green Energy Development in the framework of BSEC

Strengthening Greece's partnership with all respective countries in the broader region of the Black Sea Economic Cooperation organization (BSEC) is a priority of the Greek Government. In the energy sector our basic aim is to further promote cooperation with Russia in the petroleum and natural gas sectors, as well as with Azerbaijan in the natural gas sector through our relevant Inter-governmental Agreements, as well in the Renewables and Energy Efficiency sector through the implementation of relevant bilateral MoUs with countries of the region, like Azerbaijan and Turkey.

For the Greek Government, energy and environment policies form part of a single integrated strategy. In order to underline this and in order to promote horizontal planning, the Ministry of Environment, Energy and Climate Change was established in 2009, with the overall objective to promote Green Energy Development and to facilitate the transit to a safe and secure lower carbon economy.

The need to pursue a Green development strategy at the national level is essential since it is dictated by challenges, such as the critical climate change indicators, the negative effects of energy consumption on our environment that is further aggravated by the rising energy demand in the face of dwindling resources. Moreover, a strategy to transit to a lower carbon economy constitutes a catalyst for new investments, new technologies and job creation. Accordingly, when Greece assumed the BSEC Chairmanship in 2010, we incorporated the motto "Black Sea turns into Green" and made it our priority to promote Sustainable Development, Innovation and Governance in the broader region.

We were pleased that during our 2010 BSEC chairmanship the Joint Declaration on the promotion of Green Development was signed, in Nafplion, in October 2010. The overall aim of this political Declaration is for all BSEC countries to work together towards the emergence of a new model promoting the principles of sustainable development, innovation, and good governance. That could strengthen the broader area and lead to the creation of a dynamic hub with multiplying effects in the wider Black Sea region.

The Declaration set up a special task force for the promotion of Green Energy Development and stressed the commitment of the BSEC member countries to gradually move towards a lower carbon economy on the basis of energy efficiency and the increased use of renewables and natural

gas. Most important of all, the purpose of the Joint Declaration is to underline our belief that the goal of achieving sustainable development and enhancing energy security can be achieved more effectively on the basis of regional cooperation.

In this respect, the Ministry of Environment, Energy and Climate Change, in close cooperation with the Ministry for Foreign Affairs, has already presented the draft Terms of Reference of the Task Force in the BSEC Energy Working Group held on 3-4 May 2011, in Istanbul, in order to adopt common policies and implement projects to promote both Green sustainable Development and energy security through natural resource efficiency in the broader region. At present, the works are focused on the establishment of the Task Force and the nomination of its members through ongoing negotiations among all countries of BSEC on the finalization of its Terms of Reference.

The next meeting of the energy Group of BSEC to further examine these and other issues, including the presentation of the candidatures for the coordination of the task force (Greece, Turkey) took place 5-6 December 2011, in Istanbul. The decision on the aforementioned group of national experts to coordinate the works of the task force was taken by the BSEC high level representatives committee, consisting of diplomats coming from the Ministries of Foreign Affairs of the BSEC member countries, during their meeting on 14-15 December 2011 and was then officially adopted through a relevant Resolution of the BSEC Ministerial Council of Foreign Affairs scheduled for the following day.

Promoting regional cooperation is an important element of Greece's strategy that is illustrated by our initiatives regarding the Energy Community of Southeastern Europe which was established by the Athens Treaty in 2005 and by our efforts regarding the Mediterranean Energy Dialogue, which was enhanced through the Mediterranean Climate Change Initiative launched by the then Greek Prime Minister George Papandreou on October 2010.

This approach is also consistent with EU policy and the Commission's recent Communication on external energy policy focused on the need to work regionally to promote energy security and sustainable development.

Green Energy Development at the national level

The Greek policy to achieve a national sustainable energy model is mainly based on achieving the EU's 2020 targets for Renewables, Energy Efficiency and Energy savings, as well as on increasing the use of natural gas. Our target is to raise the share of renewable energy in the gross total final consumption of energy to 20% by 2020, which is actually 2% higher than its EU obligation and almost triple the 6.9% share in 2005.

Greece has also set a specific target for renewable energy sources to provide 40% of electricity generation by the same year (the share in 2010 was 15%) and to provide 20% of primary energy for heating and cooling by 2020. We are especially ambitious regarding Greece's significant wind power potential and the government foresees wind power capacity to increase from around 1.3 GW in 2010 to 7.5 GW in 2020, far more than the other renewable energy technologies combined.

A key part of our strategy is to connect the abundant wind and solar power resources of the Greek islands to the mainland transmission network. This would turn into reality by gradually interconnecting the islands among them and to the mainland. Potentially, this could also be extended to other parts of the EU and S.E. Europe.

In this respect, we are looking forward to the European Commission's new legislative proposal, submitted in 2011, regarding common energy projects of European interest, which will be replacing the 2006 Decision of the European Parliament and the European Council on the guidelines of Trans-European Energy Networks, in order to evaluate the integration of this strategy with the EU's infrastructure package.

In order to achieve our national goals we have estimated that a tenfold increase in installed capacity of Renewables from 4,500 MW to over 15,000 MW is required. This amounts to considerable investment opportunities in Greece, of about €16 billion leading to a €1.3 billion savings that will be collected by not having to buy costly green house gas emissions rights.

Regarding Renewables, we are also envisaging cooperating with our EU partners regionally. Law 3851/2010 on accelerating the development of renewable energy sources significantly boosts the development of Photo Voltaic (PV) systems by setting ambitious targets and establishing measures necessary for their attainment including notably through simplification of licensing procedures, revision of the feed-in tariff and incentive to overcome obstacles at local level.

Along these lines, the Greek Government has developed the idea of a mega-project, capable of harnessing the vast solar potential of the region, project "Helios", which was officially presented in September 2011, at the 26th European Conference on Solar Energy. Its target would be to produce solar generated electricity with an installed capacity of 3 to 10 GW on the basis of a cooperation mechanism with other Member States, under the framework established by the Renewable Energy Directive 2009/28/EC, taking advantage of various possible schemes such as joint projects, joint supports schemes and statistical transfer.

Since its first presentation, the Helios project has significantly progressed, with an intensification of meetings at the political level, among others with the EU Energy Commissioner Mr. Gunther Oettinger and with the German Minister for Environment, Norbert Röttgen. Moreover, the Ministry for Environment, Energy and Climate Change is planning a conference dedicated to the Helios Project, scheduled to take place most possibly during the first semester of 2012, with the participation of high-level EU officials as well as representatives of the European Transmission Systems Operators on Electricity (ENTSO-E), the international solar industry and the financial sector.

The support for this project, within –inter alia- the context of the EU Infrastructure Package, would be of great significance for both Greece and its EU partners. For Greece this project will enable the monetization of its abundant solar energy and turn it into the main driver of the country's green growth strategy, contributing to job creation and to the nation's economic recovery. Its significance was underlined as it was recognized by its reference in the statement of the European Council Decision of October 26th 2011 where it was agreed that future cash flows from this project would be committed, in excess of those already included in the adjustment program, to further reduce the country's debt.

The potential benefits for other Member States from the realization of "Helios" are abundant: The monetization of Greece's PV potential could help address the issues arising from Germany's decision to phase out nuclear power; it could facilitate the attainment of the binding targets of the EU RES directive; promote the relevant technology and the generation of significant cost savings by using renewable electricity produced in a country with higher RES potential and lower production cost.

With regards to its returns, investors will be able to benefit from the more attractive investment

returns (higher yields for the same cost of investment). The advantage of the “Helios” project, in comparison to others such as DESERTEC and the Mediterranean Solar Plan, is that it is a mid-term project that does not have to face important technological, economic and political challenges

Finally, the “Helios” project illustrates our approach which stems from our conviction that energy and environmental challenges are global and can be addressed more effectively with collective action. Moreover, our guiding principle regarding energy security and international energy policy is that all states, whether they are producers, consumers or transit countries, are clearly interdependent.

Natural gas infrastructure in South East Europe and the role of Greece

In order for Greece to achieve the goal of increasing the use of the environmentally “friendliest hydrocarbon”, one of the first tasks of the Government was to facilitate investments by further liberalizing the market while enhancing competition and transparency. Indeed, in the recent In-Depth Review of the Greek Energy Sector, which was officially announced on 28 November 2011, in Athens, the Executive Director of the International Energy Agency congratulated the Government for adopting significant “break-through” legislation which has resulted in a more liquid market and a more transparent and competitive environment. More specifically, relevant measures including the new Network and Supply License Codes, allow independent suppliers and large customers, willing to be self-supplied, to import gas into the country and since 2010 more than a dozen new players have entered the market by contracting large LNG (Liquefied Natural Gas) import volumes.

Moreover, Greece is one of the first countries to have already transposed into national legislation the EU’s Third Energy Package, with a law adopted in August 2011. Notable, amongst the various provisions for gas, is the full unbundling of DESFA, the national Gas Transmission System Operator. The Development Strategy for natural gas includes the upgrading of the LNG terminal in Revythoussa and fundamental extension of the gas network to most regions of the country. Moreover, the possibility for a new strategic gas storage facility is being studied.

Yet, the Greek energy policy is not designed on a purely national context. The aforementioned IEA report stressed the fact that Greece is ideally placed to act as a major transit corridor for the broader region. Enhancing the role of Greece as an energy hub is a major priority of our energy security strategy. The cornerstone of our security of supply policy is the principle of diversification of sources and routes. We support and contribute dynamically to the EU’s Southern Gas Corridor strategy by planning major infrastructure. Greece has consistently advocated a policy of Security based on diversification with Caspian resources and we are proud of the fact that we are the first EU country to benefit from supplies of Azeri gas, which we receive through the Turkey-Greece Interconnector.

This is consistent with our commitment to the development of Azeri natural gas. However our security depends on strengthening diversification not only for Greece but for our broader SE European region. Therefore, we believe that the Southern Gas Corridor has to become operational as soon as possible. By virtue of its legal and regulatory framework, which is guaranteed by a strong independent Regulator, Greece provides a “level playing field” for all projects interested in crossing through Greek soil.

Politically, the concerned Governments are satisfied that the ITGI system, which includes the IGB, is the most mature project which should be supported in order to start the phased development of the Southern Gas Corridor. It is important to stress the ITGI system's unique potential to secure the region's security of supplies. Above all, it is scalable up to 24-29 bcm: that is the IGI can be scaled up to 16 bcm while also supplying the Greek market; and the IGB can be scaled up to 5, and eventually, if the need arises, 10 bcm, which will be used to supply the markets of S.E. Europe thereby contributing decisively to the gasification of these states, which are so far mostly dependent on a single source.

Moreover, the ITGI system provides multiple levels of supply security and is not exclusively dependent on one route. Therefore, it can operate even in case of disruption of supplies through Turkey, something which, as with all routes cannot always be avoided and unfortunately did occur during the January 2009 gas crisis. More specifically, it can operate with additional LNG supplies from the Greek terminal in Revythousa, near Athens, and with gas from North Africa via Italy, if operating in a reverse flow fashion.

Significantly, the ITGI system can function viably with the gas which is expected to become initially available from the Shah Deniz 2 gas field. The system's maturity guarantees that, once the gas is available, delays will be avoided. This is because it has already concluded the necessary Inter-Governmental Agreements, it has completed the necessary time-consuming environmental licenses, most of the technical studies are completed and it has received the TPA (Third Party Access) exemption.

Regarding its financing, which is a hybrid of equity and project financing, apart from having secured €145 million from the EU, Greece's and more specifically DESFA's cooperation with the EIB and other Credit Agencies is well developed. Moreover, the project sponsors have assured that they would be able to finance the project entirely with their own equity. For all these reasons, we are convinced that the ITGI system addresses the call expressed by Presidents Barroso and Aliyev in their Joint Declaration adopted in January 2011, that the Southern Gas Corridor should start as soon as possible enabling Azeri gas to contribute to the energy security of the EU and South-eastern Europe.

The Burgas –Alexandroupolis oil pipeline

On 4 December 2011, the government of Bulgaria expressed for the first time its unjustified concerns over the financial viability of this very important project noting that it would leave the consortium which had been developing the oil pipeline. Burgas-Alexandroupolis remains a project of pivotal importance from a geostrategic, economic, environmental and security of energy supply point of view. The fact that the Bulgarian government announced its decision to leave the project a few days after it had officially approved the environmental impact assessment study of this pipeline has surprised and confused its partners.

Yet what should be emphasized is that Greece and Russia, the two remaining partners of the 2007 Intergovernmental Agreement continue to fully support this financially viable and mature project. This was clearly reconfirmed during the last meeting, of the Hellenic –Russian High Level Joint Working Group on Energy, which was held on 12 December 2011 in Athens, where the two sides expressed their surprise and disappointment for this new Bulgarian position. It should be noted

that the in-depth review of IEA on the Energy sector of Greece issued on November 2011 notes also that: “the Burgas – Alexandroupoli pipeline would further enhance diversification of supply routes”.

Developments on the exploration and exploitation of hydrocarbons in Greece

While increasing the use of renewables and implementing energy efficiency measures in order to meet the EU’s climate package targets, together with the increased diversification of sources and routes are the key elements of the Greek energy security strategy, a policy for the extraction and production of indigenous hydrocarbon resources is now also being pursued, following a 15 year gap since the last exploration round was tendered. According to experts, there are certain areas in Greece of particular interest, which merit further attention for exploration in order to assess their prospective oil and gas reserves.

The first task was to create an appropriate legal framework for this sector and a law (4001/2011) has been enacted that establishes the Hellenic Hydrocarbons Management Company S.A., which is mandated to organize and supervise the necessary call for tenders, licensing and contracting permits, consistent with EU rules. Moreover, the law updates the existing framework to conform to EC Directive 22/94 and incorporates new trends and international best practices including non exclusive data acquisition.

On the basis of such practices, the State will be able to “assess” the potential of Hydrocarbon-prone areas, offshore and onshore, inviting and licensing “in a non-exclusive basis” geophysical contractors to cover - with indirect methods - vast areas and asses them for their exploitable potential. These “non-exclusive data” will be then marketed by the licensed Contractor to the Oil Exploration Companies willing to further invest during the subsequent Licensing Rounds that will follow.

In parallel, the government, following their evaluation, will designate the areas to be licensed and proceed to a new round of concessions as mentioned above. The international public invitation for the maritime zones of the Ionian Sea and the area to the South of Crete, was prepared by a committee of specialists, officials and academics, taking into account the latest international practices, and has already been published since September 2011, in the Official Journal of E.U. Interested companies may receive from the Ministry the relevant material to formulate their offers, in which they have to demonstrate their technical and financial capacity to implement the project.

Chapter 4

The strategic significance of Azeri exports for Europe's southern gas corridor strategy: the Shaz Deniz 2 race and beyond

Dr. Theodoros G.R. Tsakiris, Senior Analyst, Middle East Economic Survey, Research Fellow & Coordinator, Programme on the Geopolitics of Energy, ELIAMEP, Hellenic Centre for European and Foreign Policy

Europe's Southern Gas Corridor Strategy is founded on the necessity to maximize the imports of non-Russian gas via non-Russian controlled territory, so as to establish a third, following Russia, Norway and Northern Africa, route of supply diversification. The European Commission has recognized as potential sources of supply for the Southern Gas Corridor not only Caspian (Azerbaijan) & Central Asian (Uzbekistan, Kazakhstan and primarily Turkmenistan) but also Middle Eastern gas from Iraq's future production. Any meaningful discussion on the feasibility of the three main Southern Gas Corridor Strategy pipeline projects, namely Nabucco, Italy-Turkey-Greece Interconnector (ITGI) and Trans-Adriatic Pipeline (TAP) that vie for the transportation of (initially) Azeri gas to Europe via Turkey, requires an examination of the geopolitical environment which will –to a large extent– determine their eventual implementation.

This paper will first succinctly analyze the geopolitical rationale behind the promotion of the Nabucco project and Europe's Southern Gas Corridor Strategy by focusing on the reasons which have led to the weakening of the Nabucco pipeline project compared to its two smaller and more cost-efficient competitors. One of the major deficiencies in the planning of the Nabucco project was that it overemphasized the benefits the project would offer to the European component of the Greater Black Sea Region and underemphasized the way a shift in the regional balance of power in Azerbaijan's immediate neighborhood would impact on the cost/benefit analysis of Baku, which is the irreplaceable linchpin of the entire Southern Gas Corridor Strategy.

Nabucco was a geopolitical project that rose and fell on geopolitical grounds, without making any significant economic/commercial sense for the Shah Deniz 2 partners if it were not able to secure a second or third supply source from Iran, Iraq or Turkmenistan. The sourcing of the non-Azeri gas developed into a real *cul de sac* between Nabucco strategists and EU, U.S. diplomats who found themselves often at odds with their own proclaimed strategy. Even though Nabucco's European patrons and Washington agreed from the start on what would be the geopolitical benefits served by the implementation of Nabucco, namely the lessening of EU dependence on Russian gas, they differed greatly on what geopolitical tactics should be followed in order to pursue the realization of the project.

Iranian Exclusion

When Nabucco initially appeared on the Caspian Gas arena in 2002-2003, it targeted both Azeri and Iranian gas resources. According to its original rationale Shah Deniz 2 gas, which was initially expected in 2014-2015 would be complemented by existing Iranian gas resources that already reached Turkey since 1997. After the rise of Ahmadinejad to power in 2005 and the subsequent culmination of western economic warfare on Tehran, which was recently climaxed by the decision on the European Council to impose on 24 January 2012 a boycott on Iranian oil exports to the EU,¹⁴ the Iranian supply for Nabucco ceased to be a realistically attainable prospect. Moreover, since 2009 the U.S. also effectively banned even the transit of Turkmen gas to Nabucco if that were to transit via Iranian territory.

U.S. Sanctions against Iran obliged Nabucco to re-route its entire sourcing strategy and focus on the securing of future Iraqi gas exports. The problem of course for Nabucco was that this rerouting would not only expand the length of the project for some 500km. It would also expand the cost of a project that still publicly claims it would cost the same amount of money it cost back in 2003, 2005 or 2007. It was none other than the EU Energy Commissioner Guenther Oettinger who acknowledged on 8 May 2011 that “Nabucco will cost between EUR 12 billion and EUR 15 billion”.¹⁵

For Shah Deniz planners it would be unthinkable to subsidize a 31 bcm/y pipeline with a 10 bcm/y export capacity, which would be available by 2017/18, especially if its final construction cost would almost double to an average of EUR 13 billion. The near doubling of Nabucco’s original cost estimate was also not lost on the poorer members of this pan-European coalition, namely the crisis-ridden and IMF-supervised economies of South Eastern (Romania, Bulgaria) and Central (Hungary) Europe which would have to share -via their small national champions- an equal burden of the cost for the construction of Nabucco with the powerful northern European (super) majors, such as Austria’s OMV and Germany’s RWE.

Iraqi Deadlock

Yet, the ostensible U.S. control over Iraq and the special relationship between Washington and Irbil would appear to be offering an alternative to the much needed Iranian contribution. Iraq’s prospective involvement in the Nabucco project, which will justify for most of the drastic increase in Nabucco’s capital expenses, dates back to the signing of the project’s Intergovernmental Agreement in July 2009, when Iraq’s Prime Minister Nuri al-Maliki pledged to supply the project with “at least” 15 bcm/year of gas.¹⁶ More importantly the probability of an Iraqi source further increased from the fact that two of Nabucco’s shareholders, OMV and Hungary’s MOL had started to produce since January 2011 small quantities of gas in Kurdish Iraq through their cooperation on the development of the Khor Mor and Chemchemical fields with UAE-based Danas gas.

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¹⁴ http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/EN/foraff/127444.pdf (accessed on 23/01/2012)

¹⁵ “EU Energy Commissioner: Nabucco to cost between EUR 12b to EUR 15b”, The Wall Street Journal, 09/05/2011

¹⁶ Middle East Economic Survey, 20/07/2009.

If the KRG (Kurdish Regional Government) would offer Nabucco a long-term supply contract of 5-10 bcm/y then the project could have a far better chance of being implemented. Nabucco planners would be able to justify the cost of their 500km long extension and more importantly argue to the Shah Deniz skeptics that the project would be bankable since at least 50% of its throughput capacity could be reserved from a combination of the Khor Mor, Chemchemal and Shah Deniz fields. The problem in this case is that there are very few things that could unite the Shi'a and Sunni Arabs of Iraq as the possibility of KRG emerging as a de facto energy exporter outside the national policy framework and Iraq's OPEC obligations. The export contracts KRG could sign with Nabucco would effectively be null and void without Baghdad's consent in the absence of a Federal Oil Law.

This deadlock has plagued the essence of Iraqi politics since 2008 and even though a draft Petroleum Law was agreed at the Parliamentary Committee Level on 17 January 2012¹⁷ it is not certain that it would get the Parliament's final approval. The complete withdrawal of U.S. combat troops from Iraq in December 2011 has further complicated the labyrinth of post-Saddam Iraqi politics thereby dis-incentivizing the Kurds from making any concessions to their Arab partners. More importantly Sunni and Shi'a Iraqis would not even agree to the export of KRG gas, especially if Baghdad wins the upper hand vis-à-vis Irbil on future gas exports, because they want to use gas internally so as fill the gap of existing electricity generation in the non-Kurdish sectors of the country.

Bridge Over the Caspian: Turkmenistan to the Rescue?

On 12 September the European Council decided to grant an unprecedented mandate to the European Commission allowing it to negotiate a legally binding agreement for the construction of a Trans-Caspian Gas Pipeline between Azerbaijan and Turkmenistan. This is the first time the Commission's bureaucrats have been given the authority to negotiate a prospectively major energy import agreement, such as the sourcing of Turkmen gas to Europe, in lieu of the Union's Member-States. Nabucco's CEO Reinhard Mitschek applauded the Commission's decision as he tried to underplay Turkmenistan's significance as a "make or break" deal for Nabucco's viability, noting in a press release that "This groundbreaking initiative taken by the European commission matches the aim of the Nabucco project to enable the transportation of a broad diversified gas portfolio".

Leonhard Birnbaum, RWE's Head of Strategic Planning, told during a press conference in the sidelines of an energy conference organized in Munich on 13 September 2011, that Nabucco "is making good progress" following the EC's Turkmen mandate, noting that "If the talks are successful there will be enough gas [for Nabucco] even without [gas from North Iraq]".¹⁸ The news was not welcome in Russia, who on 16 September 2011 oversaw the finalization of South Stream's main shareholders structure during a ceremony in Sochi. On 13 September Russia's Foreign Ministry issued a statement that did not mince its words with regards to Moscow's opposition vis-à-vis Europe's "intervention" in the Caspian Sea.

The statement noted that the construction of a Trans-Caspian pipeline would be very challenging

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¹⁷ "Iraqi Leaders Agree Draft Oil Law", Reuters, 17/01/2012

¹⁸ DowJones, 13/09/2011

since the project would be crossing a region of “high seismic activity”. “As we know” the Russian Foreign Ministry said, building such a project “is a first experience for the European Union too, and we are surprised that it is in the Caspian Sea, which does not border any of the European Union members”.¹⁹ EU Energy Commissioner Gunter Oettinger did not mince his words either, noting, with phenomenally un-diplomatic clarity during an interview with Deutsche Welle on 14 September, that Russia should not use its gas exports to politically pressure Europe and that the South Stream project is obstructing Nabucco. “If the Russians try to hinder Nabucco both technically, by constructing South Stream, and politically, by pressuring Ashgabat and Baku, I personally will have less confidence in numerous gas contracts with Russia and believe less that gas is not a political instrument for Russia”.

Why this un-diplomatic tone? The first obvious reason relates to the October 1st, 2011 deadline set up by the Shah Deniz consortium for the submission of the finalized transportation proposals for the transit of the 10 bcm/y that are expected to be exported to Europe via Turkey by 2017. The second less obvious reason is that the momentum which was built around a statement made by Turkmen President Gurbanguly Berdymukhamedov in November 2010²⁰ regarding the de-linking of the TCP from the Turkmen/Azeri dispute over the sovereignty of the Kyapaz/Serdar fields has all but evaporated, despite the first ever visit by an EC President to Turkmenistan in January 2011.

Yet, since January 2011,²¹ Berdymukhamedov has confirmed his willingness to support a TCP option, but has refused to put his money (or more accurately his gas) where his mouth is. He has remained as elusive as ever and has been able to procrastinate by literally “cashing in” on the drastically expanding Chinese interest over the vast resources of the South Yolotan reserves. This interest has been translated into a \$18 billion investment in the form of soft loans extended to Turkmenistan by the Chinese Development Bank over the last two years. As long as China subsidizes Turkmenistan’s financial needs, Mr. Berdymukhamedov has no immediate need to call his bluff on Russia and seriously consider promoting the TCP option which could save Nabucco’s life by mid-2012.

Moreover there is always the possibility that Russia may step in and re-purchase a significant portion of Turkmenistan’s idle 40-50 bcm export capacity that Moscow shut down since April 2009, if only to serve the purpose of killing Nabucco; a prospect that has increased especially after Gazprom’s recent rapprochement with RWE (July 2011) that has limited the number of Nabucco enthusiasts in Ashgabat. Finally, despite public attestations to the contrary, Azerbaijan may be far less keen on promoting a TCP option especially if this is not translated to any practical political gains for Baku in its continuing dispute with Turkmenistan over the Kyapaz/Serdar fields and the limits of their respective territorial waters in the Caspian Sea.

Even if the Kyapaz/Serdar dispute was resolved in Baku’s absolute favour, a rather dubious pros-

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¹⁹ Middle East Economic Survey, 19/09/2011

²⁰ The Turkmen President said he was “firmly convinced that laying an underwater pipeline in the Caspian Sea may be carried out only with the consent of those countries, the sections of which it will cross”, the Azeri Press Agency reported on 19 November 2010.

²¹ “Is Turkmenistan Again Moving Towards Russia, Despite EC Visit?”, Eurasia Energy Observer, 01/06/2011, <http://www.eurasia-energy-observer.com/news/2011/turkmenistan-2>

pect, Baku would have very little incentive to facilitate the transit of Turkmen gas through the SD2 related infrastructure, since it would prefer to commit the system's transit capacity in order to serve its own gas exports beyond Shah Deniz 2. Azerbaijan understands that recently discovered offshore fields like "Umid", "Babek", "Absheron", and "Nakhchivan", could double by the early 2020s (circa 2022-2023) its net export capacity to 20 bcm/y, that is three to five years after SD2's exports reach their maximum level. That is exactly why the Shah Deniz partners are demanding from Nabucco and primarily from TAP and IGI/Poseidon that they are scalable in order to accommodate volumes exceeding the 10 bcm/y which could be expected to flow to Europe by 2017/2018.

The Greek Crossing and BP's Fourth Export Alternative

Since Nabucco's proposal has been strategically weakened primarily as a result of its inability to find additional supply sources, the Shah Deniz partners are focusing their attention on the two smaller-capacity pipeline projects, the ITGI and TAP, who are far more attuned to the actual needs of Azerbaijan and the Shah Deniz exporters. As Gulmira Rzayeva notes in her chapter both projects offer a mix of comparative advantages and disadvantages. On the one hand TAP has a clear advantage in terms of its ability to self-finance the cost of the project without recourse to any form of E.U. or national funds and subsidies. On the other hand ITGI is far more advanced in terms of securing all the necessary and time-consuming ESIA (Environmental and Social Impact Assessment) permits as well as its TPA (Third Party Access) Exemption permit for 8/9th of its initial transit capacity.

Yet apart from these two partially complementary options, since they both target the Italian markets via Greece, a fourth and somewhat nebulous player emerged literally at the eleventh hour of this ten year marathon game. Less than a week before the October 1 deadline expired for the submission of the comprehensive bidding proposals regarding the export of 10 bcm/y to Europe from Shah Deniz 2, BP, which is also the project's operator, revealed the existence of a fourth export option beyond the vying Nabucco, ITGI and TAP pipelines.

BP's South East Europe Pipeline or SEEP project, which is 1,300-km long and aspires to copy Nabucco's route from European Turkey to Baumgarten will be tailored to a net export capacity of 10 bcm/y that will probably be scalable to 20 bcm/y in order to allow for the increase of future export capacities once additional Azeri gas becomes available by the early 2020s from the development of new fields in offshore Azerbaijan. Al Cook, BP's vice-president for Shah Deniz development, described the 10 bcm/y project as "another possible solution" while noting that "it doesn't follow from this that we necessarily find flaws in the three offers. But it is wise to have another option on the table".²²

Indeed, BP's last-minute proposal raises some serious questions regarding its credibility. What would be the cost of the project? Will it be an independent pipeline system the likes of Nabucco or will it use existing gas export infrastructure that connect or are in the process of connecting the markets of South Eastern Europe with the main Central European hub in Baumgarten? How will

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²² David Blair, "BP Plans Gas Pipeline to Europe from Azerbaijan", Financial Times, 26/09/2011

these 10 bcm/y be divided between the transit states in Bulgaria, Romania and Hungary and if BP intends to get only 5 bcm/y to Baumgarten will this make any economic sense?

If BP opts to build an independent gas system then it would have to go through a strenuous regulatory approval process within the EU states in order to secure all the necessary permits. These permits are extremely difficult to get in time even if the bureaucracies of the involved states want to support the materialization of your project. Therefore BP needs to provide the transiting states with the necessary incentives in order to get through the permitting process unscathed and that means giving them an equal share of the project's benefits both in gas and in rates of return. The problem with these incentives is that these IMF-supervised states, save Turkey, will have already spent by 2014 several tens of million EUR in order to integrate their gas markets and pipeline systems through the construction of several 3-5 bcm/y interconnectors, all of which are 1/3 financed by the European Energy Programme for Recovery. The 3-5 bcm/y Interconnector between Romania and Hungary was commissioned in October 2010. If BP wants to bring around 5 bcm/y to Baumgarten then it would have to sell 1-2 bcm/y to Bulgaria, 1 bcm to Romania and another 1-2 bcm/y to Hungary. One major problem for BP is that the infrastructure for the satisfaction of the national gas needs for Bulgaria, Romania, and Hungary would be already in place 3-4 years before the beginning of production in Shah Deniz Phase 2.

Why should these four states spend a single cent to construct a pipeline they would already have by late 2013? In addition to that, BP would have to build an entirely new 10 bcm/y pipeline between Turkey and Bulgaria, a prospect that would cost at least €700 million since the TGI (Turkey Greece Interconnector), which is a shorter 3 bcm/y capacity pipeline, cost around EUR 300 million to construct in 2007.

There is of course another solution for Shah Deniz and one BP is more likely to choose from by following the so-called "minimum built" criterion. This solution excludes the transfer of SD2 gas to both Southern Italy and Baumgarten and reserves it for the requirements of the regional market that mostly needs it: that is South East Europe itself. Instead of overlapping with the aforementioned interconnectors and construct an entirely new system from Eastern Thrace to Baumgarten, BP could try to utilize them.

In that case it would also need to think of the Greek market which is (since 2007) already connected with Turkey and will be (by late 2013 or early 2014) connected with the Bulgarian market via the IGB pipeline. Greece is also the only EU client of Azerbaijan, while SOCAR is among the front-runners for the privatization of Greece's Public Gas Company or DEPA which controls 1/3 of the IGB and 50% of the IGI/Poseidon project, a direct antagonist to BP's SEE Pipeline.

If BP chooses not to ignore Greece and reserves for Greek importers through its TPA-regulated capacity, the right to import at least 1-2 bcm/y of SD gas via the ITG, then BP cannot possibly expect to get 5 bcm/y to Baumgarten. The most logical option if BP wants to construct SEEP with the minimum cost would be to utilize both the ITG and IGB, sell 1-2 bcm to Greece, Bulgaria, Romania and Hungary and then get around 2 bcm/y to Hungary which could be subsequently sold to either Austria or Croatia via the existing interconnections.

Chapter 5

The financial aspects of the development of renewable energy in Azerbaijan

Mr. Ramiz Rahmanov, Research Fellow, SAM Center for Strategic Studies under the President of the Republic of Azerbaijan

The burning of traditional sources of energy such as gas, coal and oil results in the emission of greenhouse gases whose high concentrations in the atmosphere cause rapid climate change. After the problem of global warming was internationally recognized by the world community, a number of countries started to search for emission-free alternative sources of energy which could replace traditional sources of energy such as gas, oil and coal. The potential successors of the traditional sources are considered to be hydro, wind, solar, and biomass. These sources are also called renewable because they are never exhausted.

However, the immediate switch from traditional to renewable sources is hardly possible. The reason is that the techniques of the utilization of renewable sources have not been technically developed enough to produce such amounts of energy that will satisfy the current demand. Consequently, the low productivity of renewable energy detracts the private sector from investing in the production of energy and in particular electricity from renewable sources.

The governments of most states understand the seriousness of the threat of the global warming for the eco-system of the planet and make policy commitments to develop the renewable energy sector. They try to establish a business environment which will be attractive for the private sector. A friendly environment includes workable legislation, effective financial and fiscal instruments, greater awareness of businesses on opportunities offered by the renewable energy sector and the promotion of favorable R&D conditions.

For the purpose of this paper, I will focus only on the financial side of the renewable energy sector. First, I will discuss the current situation in the sector of renewable energy. Then, I will review the international experience in promoting the development of renewables. Furthermore, after having discussed the financial and fiscal instruments which are in place in Azerbaijan and having taken into consideration the successful experience of the countries, I will propose the financial and fiscal instruments which could accelerate the development of the renewable energy in Azerbaijan. Finally, the paper will be concluded with a discussion of the overall potential benefits that the renewable sector could have on the national economy.

The industry today

In 2009 Azerbaijan produced 18.87 billion kW hours of electricity: 2.31 billion kW hours of

which has a hydro origin and 0.02 billion is of a wind origin.²³ Thus, in total, 12.35 percent of electricity is produced from renewable sources (in the EU the figure is 20.7 percent)²⁴. However, 12.35 percent is not the limit. The feasible hydropower potential is 16 billion kW hours per annum and the feasible wind potential is 2.4 billion kW hours per annum. This means that currently Azerbaijan utilizes only 14.44 percent of its hydro potential and less than 0.01 percent of its wind potential. Furthermore, there is a good potential for the development of solar power. In Azerbaijan the number of the sunny hours in a year is between 2400 and 3200 compared to 500-2000 in Russia and the amount of solar power per 1 sq. meter varies between 1500 and 2000 kW hours compared to 800-1600 kW hours in Russia and 1200-1400 kW hours in France.²⁵ However, despite such a huge potential, the solar power is still underdeveloped. Additionally, Azerbaijan is rich in geothermal power potential which also remains unused.

The international experience

International practice shows that the development of the renewable sector is impossible without the state support. To promote renewables, the government has to create conditions which will make the renewable energy industry profitable for the private sector to operate in. Although every country has its own approach to the development of the renewable sector, at present, two approaches to the development of renewable energy can be identified: the Feed-in Tariff (FIT) and the Renewable Portfolio Standard (RPS) which is also known as Renewable Obligations (RO). The former approach assumes a guaranteed price for electricity produced from renewable sources. And, the later one imposes an obligation on electricity providers to have a predefined proportion of the supplied electricity generated from renewable sources.²⁶

All projects, in their turn, are supplemented by additional stimuli such as tax incentives, loan guarantees, low rate loans and various subsidies. The FIT option is prevalent in the EU and the RPS option was adopted by Australia, Japan and the UK. To decide which option is better, one should look at the countries which have made significant achievements in the renewable energy sector. If the amount of generated electricity and installed capacity are taken as criteria, then one could conclude that countries which implemented the FIT option are more successful in promoting the penetration of RES. For example, according to 2009 statistics, the amount of electricity produced from renewable sources in Germany is 3.71 times greater than that in the UK and the total installed capacity in Germany is 5.77 times greater than the installed capacity in the UK.²⁷

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²³ The State Statistical Committee of the Republic of Azerbaijan (<http://www.azstat.org>)

²⁴ Europe's Energy Portal (<http://www.energy.eu>)

²⁵ The State Program on Use of Alternative and Renewable Energy Sources in the Republic of Azerbaijan, 2005-2013

²⁶ Lipp, Judith. 2007. "Lessons for effective renewable electricity policy from Denmark, Germany and the United Kingdom," *Energy Policy*, 35, 5481-5495

²⁷ Department of Energy and climate Change (<http://www.decc.gov.uk/>) and Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (<http://www.erneuerbare-energien.de>)

The current financial and fiscal incentives

Actually, the Azerbaijani government has already expressed a great interest in the development of the renewable sector. One of the evidences of such an interest is the adoption of “The State Program on the Use of Alternative and Renewable Energy Sources in the Republic of Azerbaijan, 2005-2013” which was published in 2004. Furthermore, in 2005, by Decision #187, the Azeri government exempted the importers of equipment related to the generation of RES-generated electricity from paying any duties. In 2007, the government also introduced the feed-in tariff scheme: Resolution #3 of the Tariff council states that a tariff for electricity produced by small hydro power plants is 0.025 AZN (0.022 €) per kW hour and a tariff for electricity generated by wind farms is 0.045 AZN (0.039 €) per kW hour.

For electricity produced by “Azerenerji” which uses fossil fuels and large hydro sources, the tariff is 0.041 AZN (0.036 €). At the same time, the resolution does not specify tariffs for electricity produced by the other renewable sources (solar and biomass). Finally, in 2009, by Presidential Decree # 123, the State Agency on Alternative and Renewable Energy Sources was established. The mandate of the Agency includes the regulation of the renewable sector, the implementation and the development of relevant policies.

Companies interested in the development of renewables projects can access long term capital at relatively low rates from the Azerbaijan Investment Company provided they have decent business plans. The Azerbaijan Export and Investment Promotion Foundation also makes contributions to the development of the renewable sector: it promotes the projects of the domestic companies to foreign investors. However, despite the presence of State Support, the renewable sector is still in its infancy.

The low development of the renewable sector in Azerbaijan is linked to several factors. First, the technologies used to produce electricity from renewable sources are novel for the indigenous business community. Since the technology is new, businesses doubt the profitability of a renewable energy investment and are thus reluctant to enter into the renewable sector. Although the Azerbaijan Investment Company is ready to finance RES-related projects, the amount they may direct to this sector seems to be insufficient for its development.

Hence, the next factor deterring the private sector from engaging in the renewable sector business is the lack of long term capital that could be available at reasonable interest rates. According to the latest statistics²⁸ (May 2011) the average interest rate is 16.55 percent for credits denominated in either AZN (Azeri Manat) or a foreign currency which is very high for making the long term investments competitive since the tariffs for electricity produced from renewable sources are not high enough for the companies to recover their investments when faced with the obligation of repaying their loans at such a high interest rate. In contrast, in the EU the average interest rate on loans to non-financial corporations is relatively low - 5.27 percent and the tariffs are relatively high: the average tariff for one kW hour produced by an onshore wind farm is 0.11 € (0.125 AZN) and the tariff for one kW hour produced from a hydro electric power plant is 0.09 € (0.103 AZN).²⁹

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²⁸ The Central Bank of the Republic of Azerbaijan (www.cbar.az)

²⁹ Statistical Office of the European Commission (<http://epp.eurostat.ec.europa.eu>) and Europe's Energy Portal (<http://www.energy.eu>)

The financial and fiscal incentives to boost renewables

To solve the problem of the shortage of long-term capital, the government can set up a venture capital fund which will provide individuals and legal entities with low rate financial resources for a long time via financial institutions. Although the minimal and maximum levels need to be fixed, an amount of capital, a period and a rate should vary according to the type of the borrower and the project scale. For example, in Slovenia and the Czech Republic some part of the project cost can be covered via low rated loans. At the same time, the lack of long-term capital can be compensated by the introduction of the investment subsidy. In Sweden, 55-60 percent of the labor, service, materials and planning costs can be covered via such subsidies.

The Azerbaijani government can use loan guarantees to ease the access of entrepreneurs to capital. Thus, for instance, the Danish state via Energinet.dk provides guarantees for credits taken by wind plant owner associations for the purpose of preparing their feasibility studies.³⁰ However, considering the higher probability of abuse with subsidies and loan guarantees, the setting up of a venture capital fund seems to be the most appropriate option for Azerbaijan.

It is obvious that in order to enable individuals and firms to recoup investments, they have to be offered fair tariffs. In the EU area, various modifications of feed-in tariff schemes are widely implemented; however, in the setting up the feed-in tariff scheme, Azerbaijan should balance the trade-off between two objectives: to boost renewables while decreasing the burden of their subsidy on consumers.

For this reason, it could be useful to refer to the German experience which to some degree encompasses these two objectives. According to the German tariff scheme for every power producer, a feed-in tariff is constant for 20 years. Furthermore, it depends on a source of energy and varies from one location to another. This helps to avoid over-subsidization since electricity producers using more developed technologies receive lower tariffs and producers located in the cities endowed with better natural conditions are subject to lower tariffs than producers who are in cities with less favorable natural conditions. Furthermore, Germans use the principle of a chronological digression which means that the later electricity producers launch their power plants, the lower tariff they are eligible for. This is done to account for the fact that the power plants constructed later are more efficient.³¹ For Azerbaijan, it is also possible to gradually decrease tariffs as soon as producers completely recover their initial investments.

The additional fiscal stimulus can be the provision of various tax incentives to individuals and firms involved in the renewable sector. Tax stimuli of a different kind are widely used in the EU. For example, in the Czech Republic, producers of electricity from renewable sources are exempted from sale taxes; in Poland, producers are exempted from either sale or consumption taxes.³² The combination of financial and fiscal stimuli will certainly encourage households and firms to invest in the renewable sector. However, it has to be remembered that the effect of the financial and fiscal stimulation package will not be significantly diminished unless clear and comprehensive legislation is in place.

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³⁰ Legal Sources on Renewable Energy (<http://www.res-legal.de>)

³¹ Legal Sources on Renewable Energy (<http://www.res-legal.de>) and Lipp, Judith. 2007. "Lessons for effective renewable electricity policy from Denmark, Germany and the United Kingdom," *Energy Policy*, 35, 5481-5495

³² Legal Sources on Renewable Energy (<http://www.res-legal.de>)

The overall impact on the economy

It should also be mentioned that combating climate change is not the only benefit of the promotion of the renewable sector. The sector can also play an important role in the raising of energy efficiency since installations can be put up in the areas which are far from the main power plants leading to the decrease of losses in transmissions. Furthermore, if the country plans to not only use installations but also produce them, it will open new horizons for the innovative industrial development of the country. The produced installations can not only be used domestically, but can also be exported. At the same time, the need for the maintenance and the production of installations will create new high skill jobs in these areas. Thus, the renewable sector in addition to the decrease of greenhouse gas emissions brings energy efficiency, innovation, industrial development, export growth and new jobs.

Conclusions

The renewable sector of Azerbaijan has good future prospects. First, Azerbaijan is endowed with natural conditions which make the renewable sector attractive for domestic as well as foreign investors. Second, the adoption of the state program and the establishment of the State Agency show the commitment of the country to promote the renewable sector. The combination of such factors as natural conditions, the willingness of the government, and the initial incentive scheme lay a good foundation for the development of this sector. However, in order to fully realize its potential, the Azerbaijani government has to create a package of incentives comprised from efficient legislation, financial and fiscal incentives for individuals and legal entities. Only after the provision of such incentives, any observable development of the renewable sector can be expected.

Chapter 6

Energy cooperation and environmental protection in the wider black sea area: renewable energy sources: new perspectives & challenges

Dr. Dimitris Papastefanakis, Director, Development Projects Department, CRES

Mr. Christos Nychtis, Associate, Development Projects Department, CRES (Centre for Renewable Energy Sources and Savings)

The development of Renewable Energy Sources (RES) faces new challenges that have to be overcome in order for RES to be successful in their role to lead towards a safer, greener and more economic energy security as part of a wider Green Energy initiative. Heretofore, the approach to RES development has pointed out specific barriers and obstacles, especially in their integration into the society and economic environment of the communities they are targeting. More, specifically the public impression on large scale RES constructions in that they heavily impact the landscape, which is valuable to the communities' tourism development and exploitation.

Moreover, that the RES projects are linked only to the profit of the private energy companies which are collecting the feed – in tariff incentives for selling their electricity to the grid without any added value resulting for the local society. There are also accusations that RES projects downgrade land and property value as well as that they are harmful and dangerous for their health and welfare of the citizen's of the nearby communities.

In order to answer the above mentioned challenges and successfully overcome the barriers set by firstly, the sometimes indeed wrong and single-minded approach on the RES development, as set by policy makers and the market itself and secondly by the false and non adequate information of the public on the RES principles of development, the Centre for Renewable Energy Sources and Saving (CRES) has design and follows a RES development approach based on the following points:

- Design and implementation of multidisciplinary RES & energy efficiency (EE) solutions/projects.
- Integration of RES into the energy needs and of the end users and the local society.
- Provision of the appropriate technical assistance and capacity building in the policy planning makers but the end – users as well.
- Holistic RES and EE approach towards the zero energy consumption communities.
- Implementation and support of large scale RES investments where environmental and social conditions are favourable.

- RES and EE development through international cooperation, third party financing and local society involvement as stakeholders of ownership.
- Implementation of socioeconomic methods for the development of RES and EE plans.
- Research on smart ICT solutions for larger RES integration into energy networks.

The Centre for Renewable Energy Sources and Saving (CRES) implements this approach as the Greek centre for Renewable Energy Sources (RES), Rational Use of Energy (RUE) and Energy Saving (ES), appointed by Law 2244/94 and Law 2702/99 as the national co-ordination centre in its areas of activity. CRES was founded in September 1987 by the Presidential Decree 375. It is a public entity, supervised by the Ministry of Environment Energy and Climate Change, and has financial and administrative independence.

Since 1992, CRES is located on its wholly owned premises, which apart from the offices they also include experimental outdoor installations, a wind energy park, specialized laboratories (biomass, photovoltaic's, passive solar systems, fuel cells, wind energy), mechanical shop, conference rooms, a library and a strong computing infrastructure. CRES has a scientific staff of more than 110 highly qualified engineers and other scientists (most of them holding a PhD Degree) and its total personnel numbers 155 people. Its main goal is the promotion of RES/RUE/ES applications at a national and international level, as well as the support of related activities taking into consideration the environmental impacts, on energy supply and use.

In the framework of International Development Cooperation CRES has undertaken the design, implementation and monitoring of operation for a series of RES projects which contain the integrative and holistic approach needed, into countries of South East Europe and the Southern Mediterranean within the context of the Hellenic Aid Project for International Development Cooperation Agency of the Greek Ministry of Foreign Affairs, the Europe Aid – Twinning and the EU FP7, MED projects.

More specifically some of these projects have included:

- Study for the Re-establishment of Salvagios Commercial School, Hostel “Manna” and Kitchen buildings located into the Hellenic Square of Alexandria, Egypt and at the same time emergence of their architectural and historical character and integration of energy saving and RES technologies such as solar and geothermal systems for heating and cooling, photovoltaics and building energy management system under the “Rehabilitation of Alexandria Greek Community Complex and Generation Centre of Technology and Sustainable Development in Eastern Mediterranean and Middle East” – a Hellenic Aid project.³³
- Study and installation of a total of 280 square meters of solar collectors for covering sanitary hot water and heating demands of the Narcologic Clinic of the State Medical Centre for Psychiatry and of the Red Cross Clinic respectively in Yerevan, Armenia under the “Renewable Energy- Development And Implementation Of Solar Energy Systems In Armenia” - a Hellenic Aid project.³⁴
- Study and installation of 200 square meters of solar collectors which are covering the hot water demands due to sports activities at the Prehrambeno Ugostiteljska Schools complex at

³³ Hellenic Aid Project: Rehabilitation of Alexandria Greek Community Complex and Generation Centre of Technology and Sustainable Development in Eastern Mediterranean and Middle East, Technical Study Report.

³⁴ Hellenic Aid Project: Renewable Energy- Development And Implementation Of Solar Energy Systems In Armenia, Final Report.

Cacak, central Serbia under the “Installation Of Solar Thermal Systems In Cačak “ - a Hellenic Aid project.³⁵

- Design, study and installation of a 35 kW solar cooling system thermal powered of 160 square meters solar collectors as well as implementation of energy savings measurements such as external insulation system on walls and roofs and external shading systems on the south openings of the Faculty of Agriculture buildings at Ankara University under the “Action Plan Development For The Reinforcement Of Cooperation With Turkey In The Field Of Renewable Energy Sources” – a Hellenic Aid project.³⁶
- Study and installation of solar systems containing 2,50m2 collector’s surface and a boiler of 150lt, which correspond to a typical five member family for sanitary hot water needs, in about 350 households in the war affected regions of South Lebanon under the “RES and Energy Saving Applications in the War Affected Areas of Southern Lebanon” a Hellenic Aid project. The project included supply and installation of 90000 energy saving lamps in about 10000 households and small public use buildings. Additionally, design and installation of testing and measurement equipment for solar collectors’ certification aiming to the creation of a permanent centre of solar testing were also included.³⁷
- Implementation of feasibility studies for wind parks, small hydro and biomass projects of total power reaching 5000 MW in nine countries of South East Europe: Albania, Bosnia – Herzegovina, Georgia, Croatia, Montenegro, Moldova, Ukraine, FYROM, and Serbia under the USAID-Hellenic Aid SYNENERGY project. These studies are corresponding to investment projects of a total budget reaching €6 billion.³⁸ Moreover, implementation of energy efficiency studies and pilot energy efficiency projects into selected public buildings regarding the installation of 2000 square meters of solar collectors and 4000 square meters of external insulation.³⁹
- Study for installation of a 50kW Grid Connected Photovoltaic System at the Internat Building in Baku, Azerbaijan matched for supplying the needs of the building over a one year period. Moreover, study for the installation of 5kW Hybrid PV Power Supply Photovoltaic System at the School Building in Baku integrated to the school’s AC loads under the BSEC – HDF initiative.⁴⁰
- Restructuring of the National Energy Research Centre of Jordan according to European standards, strengthening of its capacity in Energy Efficiency sector, and the improvement of operation of Wind and PV Departments under the “Capacity Building for the National Energy Research Center” – a Twinning Project.⁴¹

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³⁵ Hellenic Aid Project : “Installation Of Solar Thermal Systems In Cačak, Final Report

³⁶ Hellenic Aid Project: Action Plan Development for the Reinforcement of Cooperation with Turkey in the Field of Renewable Energy Sources, 1st Technical Report.

³⁷ Hellenic Aid Project: RES and energy saving applications in the war affected areas of southern Lebanon, Final Report

³⁸ Synenergy Project: Activity 1: Regional Renewable Energy Assessment, Stocktaking Report

³⁹ Synenergy Project: Activity 2: Energy Efficiency in Residential and Public Buildings, Technical Report

⁴⁰ BSEC-HDF Committee: Greening Public Buildings in Azerbaijan: Promotion of Energy Efficient Materials and Technologies, Grant Application Form

⁴¹ Europeaid - Twinning Project: Capacity Building for the National Energy Research Center, Final Report

- Large scale experimentation of cost effective solutions and innovative public and private financing mechanisms backed with Structural Funds to foster RES and energy efficiency investment in low income households in the Mediterranean area under the “Energy Efficiency in Low-income Housing in the Mediterranean” an ELIH-Med project. Moreover, innovative approaches will be implemented in a large scale pilot construction level of sample households spread throughout the Mediterranean areas such as Cyprus, France, Spain, Italy and Malta.⁴²
- Development of an ICT system that will allow a higher share of RES and distributed production units in the energy balance utilizing the innovation of “flexible” offers on both the demand and supply side under the “Micro-Request-Based Aggregation, Forecasting and Scheduling of Energy Demand, Supply and Distribution” – a MIRABEL EU project. The system developed will also facilitate the generation of “flexible” offers by the energy consumers and/or producers, declaring their intention to shift in time or alter their energy consumption or production for a better price compared to the regular tariff.⁴³

Based on the experience built through the implementation of the aforementioned selected RES and EE projects and founded upon the cooperation and communication of bridges established with significant partners at an international level, CRES will continue to support and participate in efforts that forward the Green Energy and Green Development Initiative so as to secure the path of sustainability, local development and economic prosperity.

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⁴² ELIH-MED Project: Energy Efficiency in Low-income Housing in the Mediterranean, Application Form

⁴³ MIRABEL Project: Micro-Request-Based Aggregation, Forecasting and Scheduling of Energy Demand, Supply and Distribution, Description of Work.

General conclusions

Under the auspices and coordination of the International Centre for Black Sea Studies the Hellenic-Azeri Green Energy Forum aimed to promote the two countries as partners in dialogue for beneficial cooperation in the field of Green Energy Development, and to build up sustainable structures and networks for furthering energy collaboration within the wider Black Sea area and in particular the issue of Azeri gas exports to and through the BSEC region. The two roundtables held respectively in Baku (July 2011) and Athens (November 2011) brought together a variety of senior policy makers, private entrepreneurs, CEOs of state energy companies and acclaimed scientists who exchanged valuable information and good practices in an effort to raise awareness and to mobilise all relative parties with a view to promoting regional cooperation. The principal results of these exchanges can be summarized as follows by focusing on the interplay of Climate Change and Energy Policy, the promotion of Natural Gas and the promotion of Renewable Energy Resources:

The Black Sea Region, as it is defined in the statute of the BSEC organization, includes countries connecting two different continents: Europe and Asia. The area is a crossroad of political, economic and societal cultures. In the present, it plays the role of an economic, geo-political and trade hub, while serving as a crucial oil & gas transportation corridor between Europe, Central Asia, and the Middle East. The Black Sea region is characterised by extreme regional discrepancies and a number of problems and challenges such as migration, “frozen” conflicts, environmental degradation, and illegal trafficking.

Climate Change and Energy Policy

It is already evident that climate change, and particularly rising temperatures, is having a significant impact on physical, biological and human systems. Warmer temperatures are causing changes in the hydrological cycle and they affect the incidence and severity of drought and floods and the availability of water, threatening in many aspects human society and industry (e.g. agriculture, rural economies, water security and food security).

Sea level rise is another consequence of climate change that will have an increasing impact on human settlements and infrastructure. Azerbaijan and its energy industry infrastructure would be especially vulnerable to such an eventuality given the fact that the country and most of its economy practically “live on the sea”.

The Black Sea area is particularly susceptible to this kind of changes, and it is possible to experience floods, droughts, sea level rise, shortage of freshwater and degradation of agricultural products. Furthermore, local populations are likely to migrate due to severe economic and environmental impacts provoked by climate change. Species migration is also a probability, since climate change influences severely biophysical systems.

Climate change can also negatively affect the tourist industry in coastal areas, especially in the Black Sea countries that lack adequate national or regional contingency plans. Agriculture is also a vulnerable sector that can easily be afflicted by global warming, prolonged droughts, intense

floods and shrinkage of fertile land.

Oil industry installations are major sources of solid, liquid and gaseous waste to air, soil and water. The improper extraction of oil is responsible for the destruction of natural habitats for animals and plants, even though the history of post-Soviet Azeri oil development has exhibited a remarkable sensibility and sensitivity in the environmental protection of the Caspian habitat. It is notable that despite the more than tripling of Azeri oil production since independence there has been no major oil spill on the Azeri sector of the Caspian Sea, where the country's nearly entire oil production is located.

The fact that Azerbaijan's Caspian waters have so far remained safe from a Macondo-type catastrophe should be a source of pride for Azerbaijan and its international partners but it should also remain a concern of paramount importance and incessant vigilance on the part of the appropriate authorities. This is equally important not only for Azerbaijan but also for the entire BSEC region.

A regional response-management mechanism is of particular importance given Turkey's expanding oil & gas exploration activities along its Black Sea Coast that is closely followed by parallel developments on the Georgian, Russian, Ukrainian, Bulgarian and Romanian Exclusive Economic Zones. Azerbaijan's experience in leading such a debate within BSEC would prove extremely valuable for its regional partners.

Effective environmental protection requires the consideration of environmental impacts of all sectoral policies at the national level. The need for a more holistic approach leads to a cross-sectoral policy integration, as a means to "green" all economic activities already at the planning stage. The real challenge lies in the determination of environmental externalities deriving from development activities. In addition, it should be noted that until today there is no formal environmental cooperation between the Black Sea countries.

The countries of the Black Sea region need to implement multilateral environmental agreements and establish a more strategic environmental cooperation in the area. In this framework, multi-scale cooperation could be implemented in issues such as waste management, pollution or biodiversity preservation. For example, fisheries in the Black Sea constitute a cross-boundary issue. The assessment and the data collection of these fisheries are crucial in order to explore new sustainable ways of using these resources and ensure their viability

The implementation of bilateral agreements among the Black Sea countries is the only way in order to coordinate actions towards a better balance of oil, gas and other alternative energy resources. Of course, this is a very difficult task to fulfill, given the high dependence of the Black Sea on fossil fuels. It is also imperative to take into account the complexity of international and changing interests among the EU, the Black Sea countries and the multi-national corporations, in order to have realistic policy recommendations in the energy sector

Natural Gas

Azerbaijan has the potential to emerge as a major regional gas producer and exporter that will cover in the long-term a major component of European Gas Demand. Europe's Southern Gas Corridor Strategy is founded on the necessity to maximize the imports of non-Russian gas via non-Russian controlled territory, so as to establish a third, following Russia, Norway and Northern

Africa, route of supply diversification.

The European Commission has recognized as potential sources of supply for the Southern Gas Corridor not only Caspian (Azerbaijan) & Central Asian (Uzbekistan, Kazakhstan and primarily Turkmenistan) but also Middle Eastern gas from Iraq's future production. Yet it is uncontested that the implementation of the Southern Gas Corridor Strategy will start with Azeri gas resources and in particular the 10 bcm/y of Shah Deniz Phase 2 gas that will be available by 2017/2018.

Azerbaijan aims to become a significant presence in the European gas market after 2017 when Shah Deniz Phase Two will come on stream. The country's target is to have access to multiple buyers, multiple pipelines, and multiple transportation routes not only in the greater Southern Caucasus region but also in the European markets. Azerbaijan wants to be important for the EU as an energy supplier state but in a manner which is consistent with the gradual adoption of EU internal energy principles.

Azerbaijan considers the security of its access to the markets of South East Europe as a very attractive prospect since there are strong historic and contemporary commercial reasons for reaching this area. Such access may be even more attractive than getting to Italy. One of the principal energy security concerns for the countries of SEE is their almost complete reliance on an old-fashioned monopolist supplier. Providing even a small level of diversity in their gas import sources could give some political leverage to Azerbaijan.

South East European markets are attractive for the Shah Deniz shareholders and Azerbaijan as a producer country is keen to penetrate the region after 2017 when Shah Deniz Phase Two will come on line. However it does not mean that it will happen at any expense and that all three rival proposals of the Southern Gas Corridor project – Nabucco, ITGI and TAP should not fulfil the shareholders' selection criteria. The decision will be made most probably by April 2012.

Among others the most important criterion for the shareholders is the commerciality of the proposals. That said, the most commercially viable project should provide the maximum value chain for the producer, providing direct access to infrastructure and markets not merely on the evacuation route but also granting to shippers direct access to markets that are adjacent to the main evacuation route.

Renewable Energy Resources

The burning of traditional sources of energy such as gas, coal and oil results in the emission of greenhouse gases whose high concentrations in the atmosphere cause rapid climate change. After the problem of global warming was internationally recognized by the world community, a number of countries started to search for emission-free alternative sources of energy which could replace traditional sources of energy such as gas, oil and coal. The potential successors of the traditional sources are considered to be hydro, wind, solar, and biomass. These sources are also called renewable because they are never exhausted.

However, the immediate switch from traditional to renewable sources is hardly possible. The reason is that the techniques of the utilization of renewable sources have not been technically developed enough to produce such amounts of energy that will satisfy the current demand. Consequently, the low productivity of renewable energy detracts the private sector from investing in

the production of energy and in particular electricity from renewable sources.

The Greek policy to achieve a national sustainable energy model is mainly based on achieving the EU's 2020 targets for Renewables, Energy Efficiency and Energy savings, as well as on increasing the use of natural gas. Our target is to raise the share of renewable energy in the gross total final consumption of energy to 20% by 2020, which is actually 2% higher than its EU obligation and almost triple the 6.9% share in 2005.

Greece has also set a specific target for renewable energy sources to provide 40% of electricity generation by the same year (the share in 2010 was 15%) and to provide 20% of primary energy for heating and cooling by 2020. We are especially ambitious regarding Greece's significant wind power potential and the government foresees wind power capacity to increase from around 1.3 GW in 2010 to 7.5 GW in 2020, far more than the other renewable energy technologies combined. A key part of our strategy is to connect the abundant wind and solar power resources of the Greek islands to the mainland transmission network. Potentially, this could also be extended to other parts of the EU and S.E. Europe through the implementation of project Helios.

Greece has considerable experience in the developing of RES and the export of RES-related technologies and best practices and could thus prove to be a reliable partner for Azerbaijan as it develops its own RES sector. Greece's CRES / Center for Renewable Energy Sources and Savings can play a leading role in helping Azerbaijan and all BSEC member-states achieve their goals with regards to the "greening" of their economies and energy systems.

With regards to Azerbaijan an array of factors –especially in the sector of financial incentives- has created a bottleneck to the rapid penetration of RES. In 2009 Azerbaijan produced 18.87 billion kW hours of electricity: 2.31 billion kW hours of which has a hydro origin and 0.02 billion is of a wind origin. Thus, in total, 12.35 percent of electricity is produced from renewable sources (in the EU the figure is 20.7 percent).

However, 12.35 percent is not the limit. The feasible hydropower potential is 16 billion kW hours per annum and the feasible wind potential is 2.4 billion kW hours per annum. This means that currently Azerbaijan utilizes only 14.44 percent of its hydro potential and less than 0.01 percent of its wind potential. Furthermore, there is a good potential for the development of solar power. However, despite such a huge potential, the solar power is still underdeveloped. Additionally, Azerbaijan is rich in geothermal power potential which also remains unused.

The renewable sector of Azerbaijan has good future prospects. First, Azerbaijan is endowed with natural conditions which make the renewable sector attractive for domestic as well as foreign investors. Second, the adoption of the state program and the establishment of the State Agency show the commitment of the country to promote the renewable sector.

The combination of such factors as natural conditions, the willingness of the government, and the initial incentive scheme lay a good foundation for the development of this sector. However, in order to fully realize its potential, the Azerbaijani government has to create a package of incentives comprised from efficient legislation, financial and fiscal incentives for individuals and legal entities. Only after the provision of such incentives, any observable development of the renewable sector can be expected.

Annexes

Annex I

ABOUT THE AUTHORS

Dr. Zefi Dimadama is the Director General of the International Centre for Black Sea Studies (ICBSS) since July 2010. She holds a Phd on “Environmental policies and Regional Development” from Panteion University and since 2004, she gives lectures at the Graduate Programme of Political Science at Panteion University of Political and Social Sciences. Before joining the ICBSS, Dr. Dimadama worked as a lecturer at the University of Peloponnese and as a Senior Research Fellow at the Institute of Urban Environment and Human Resources at Panteion University. She has participated as a scientific researcher in several European and international conferences and has coordinated a number of European Research Networks, inter alia ESPON/European Spatial Planning Observatory Network 2000-2006, FP6 Research Programs/HERMES, Artemis 2004-2007. She is a member of the Regional Science Association (RSA) and the European Urban Research Association (EURA). Zefi Dimadama has published numerous articles in scientific Journals both in English and Greek; as well as a monograph in Greek, Dimadama, Z. “Economy, Development and Environment, Theoretical approaches and sustainable development policies” Papazisis Press, 2008. Research interests/ expertise: Environmental policies, multilevel governance, sustainable development, cross-border regional development, comparative analysis of environmental policies (European, international level), EU regional policies, Black Sea environmental governance and regional cooperation.

Dr. Gulshan Pashayeva has been working in the Baku-based Center for Strategic studies think-tank as head of the Foreign Policy Analysis Department since July 2009, and as Deputy Director since January 2011. She worked for United Nations Office in Azerbaijan for almost eight years, both as National Program Coordinator for the UNIFEM (United Nations Development Fund for Women) regional project “Women for Conflict Prevention and Peacebuilding in the Caucasus” (2001-2006) and as Public Information Associate for the UNDP (United Nations Department for Public Information) office in Azerbaijan. She also directed the Conflict Research Center, a non-governmental organization located in Baku, and taught at various state and private universities in Azerbaijan for the period of 1996-2001. Ms. Pashayeva specializes in conflict resolution and security studies, gender and language policy. She is the author of more than 40 publications including a book chapter in the *Ethnopolitical Encyclopaedia of Europe* (Palgrave Macmillan, 2004).

Ms. Gulmira Rzayeva is a research fellow at the Center for Strategic Studies (CSS) under the President of the Republic of Azerbaijan. Her area of expertise include energy security covering issues such as the energy policy of Azerbaijan and Black Sea/Caspian region energy security. As part of her engagements in the field of energy security, she has worked at the Moscow Carnegie Center as a visiting research fellow. Her other engagements in this field include a fellowship awarded by the Central Asia-Caucasus Institute Silk Road Studies Program, a joint program of the Paul H. Nitze School of Advanced International Studies of Johns Hopkins University/USA and the Stockholm-based Institute for Security and Development Policy/Sweden financed by the Rumsfeld

Foundation, USA. Over time she has participated as an invited speaker at a number of international conferences on energy security issues both in Azerbaijan and elsewhere, including Europe, the US and Singapore. Having a BA in international relations from the Baku Slavic University and an MA in Global Affairs from the University of Buckingham, UK, Ms. Rzayeva has published several scholarly publications focusing on her area of expertise.

Mr. Charalampos Pippas is Director of Public Relations and International Activities in the Ministry for Environment, Energy and Climate Change, responsible for all EU and International Energy Affairs since 2009, and the author of numerous scientific reports and papers. He has long experience in the private and the public sectors. After having granted an one-year relevant postgraduate scholarship by the Greek Atomic Energy Commission he has worked as Chief Field and Laboratory Researcher in the said Commission for energy raw materials and environmental protection purposes (1979-1986). Afterwards, over a sixteen-year period in total as ministerial official on National and EU Energy Affairs, including in the Hydrocarbons, Renewable Energy Sources (RES) and Energy Efficiency fields in the Ministry for Development (1986-1997), he had been nominated and worked as Brussels based Diplomatic Counsellor for Energy and Natural Wealth in the Permanent Representation of Greece to the EU (August 1997- mid October 2005), including as Chairman of the Energy and Atomic Questions Working Groups of the EU Council during the 3rd Greek Presidency (1st semester of 2003) when he had achieved, in close effective cooperation with the E. Commission and the European Parliament, the final adoption of a series of important EU legislative acts, including the second EU internal energy market liberalization package, the Intelligent Energy for Europe Programme, both the Co-generation of Heat and Power and the Bio fuels Directives, the EP and the Council Decision on the Community Guidelines on the Trans-European Energy Networks.

Dr. Theodore Tsakiris is an ELIAMEP Research Fellow and the Coordinator of the Institute's Energy & Geopolitics Programme. From September 2010 to December 2011 Dr. Tsakiris was the Director of the Observatory for European Energy Policy of the Hellenic Centre for European Studies (EKEM). He works as the Caspian, Iran and SEE Editor of the Middle East Economic Survey (MEES). From January to June 2010 Dr. Tsakiris worked with the Office of the Deputy Minister for Energy of Greece as a special scientific advisor focusing on international oil & gas projects. In 2008-2009 he served as the Head of the Policy Making Unit at the Special Secretariat for International Energy Policy of the Hellenic Ministry of Development. He has also worked for the office of the CEO of DESFA, the Greek Natural Gas Transmission System Operator. He is also the author of three monographs, over 30 book chapters and several hundred opeds which have been published in English, Greek, Russian, Italian, Turkish and four other East European languages.

Mr. Ramiz Rahmanov is an Economist at the Central Bank of the Republic of Azerbaijan. Previously, he worked as a Consultant and later as a Senior Consultant at the Center for Strategic Studies under the President of the Republic of Azerbaijan. Mr. Rahmanov holds a master degree in Economics from Central European University (Hungary), master and bachelor degrees in Engineering Economics and Management from Azerbaijan State Oil Academy. His research interests include Energy Economics, International Economics, Microeconomics and Public Economics.

Rahmanov's recent publications are:

The Estimation of the Potential Impact of the Accession of Azerbaijan to the World Trade Organization on its Export Opportunities. HSE Economic Journal. Vol. 16, No 1, 2012 (in Russian)

The Fiscal Position of the South Caucasus Countries. The Central Asia-Caucasus Analyst. Volume 13, No 22, 30 November 2011 (with Zaur Valiyev)

The Expectations of Azerbaijan from the Entry to the WTO: in the Context of the CIS countries' experience. Strateji Tahlil, No 3, November 2011 (in Azerbaijani)

Dr. Dimitris Papastefanakis has significant expertise in the domains of implementation of regional and national energy policy, RES/RUE, development of dissemination strategies and transfer of energy technologies. He has assisted in the development of the regional energy offices in Greece, in the technical assistance of national non EU Energy Agencies and he has developed international cooperation activities mainly in Mediterranean and Balkan countries. He has elaborated studies on market analysis, legislative, institutional and financial issues. His qualifications earned him positions as an Advisor to the European Commission, to the Governmental and Regional bodies, the Greek Ministry of Development in the design and implementation of energy projects. Over the years, Dr. Papastefanakis has co-ordinated more than 40 projects and collaborated in more than 60 projects, funded by European Commission, International Organisations, National and private funds.

Mr. Christos Nychtis is a Chemical Engineer from the National Technical University of Athens (NTUA) with a M.Sc. in Energy Production and Management from the Schools of Electrical and Mechanical Engineering of NTUA. His research focuses on energy efficiency on buildings and industries, RES integration into facilities and networks, energy market harmonisation and policy. He has conducted energy audits on households and industries, installing meters for energy profiling and proposing energy efficiency and RES measures for upgrading the facilities energy performance. He is currently involved in MIRABEL "Micro – Request – Based Aggregation, Forecasting and Scheduling of Energy Demand , Supply and Distribution" project where he is actively participating on the modeling of roles and processes for an optimal grid operation.

Annex II

ABBREVIATIONS

BP	British Petroleum
CIS	Commonwealth of Independent States
EU	European Union
ENP	European Neighbourhood Policy
EMAS	Eco-Management Audit Scheme
ESIA	Environmental and Social Impact Assessment
ENTSO	European Transmission System Operators on Electricity
FIT	Feed in Tariff
GHG	Green House Gasses
ISO	International Organization for Standardization
IOC	International Oil Companies
IGA	Intergovernmental Agreements
ITGI	Interconnector Turkey-Greece-Italy
LNG	Liquefied Natural Gas
OPEC	Organization for the Petroleum Exporting Countries
RES	Renewable Energy Sources
RPS	Renewable Portfolio Standard
RO	Renewable Obligation
SOFAZ	Azerbaijani State Oil Fund
SEE	South East Europe
SEEP	South East European Pipeline
TCP	Trans European Pipeline
TPA	Third Party Access
TAP	Trans Adriatic Pipeline
TSO	Transmission System Operator
US	United States of America

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Written by Zefi Dimadama, Gulshan Pashayeva, Gulmira Rzayeva, Charalambos Pippas, Theodoros G.R. Tsakiris, Ramiz Rahmanov, Dimitris Papastefanakis and Christos Nychtis, this paper at hand is the scientific offspring of a joint programme developed by the International Centre for Black Sea Studies (ICBSS) and the Center for Strategic Studies under the President of Azerbaijan (SAM) that underlined the significance of this joint Hellenic-Azeri Green Energy Forum. This **Xenophon Paper Special Edition** emanates from one of ICBSS' most important bilateral synergies, which has underlined the importance of the Center's role as a mutually advantageous framework for the synthesis of ideas, the composition of policy proposals and the facilitation of scientific exchanges at the highest level.

The two roundtables held respectively in Baku, on "Climate Change and Renewable Energy Resources in the wider Black Sea area" (July 2011), and Athens, on "Energy Cooperation and Environmental Protection in the Wider Black Sea area" (November 2011), both organised within the framework of the "Hellenic-Azerbaijani Green Energy Forum", brought together a variety of senior policy makers, private entrepreneurs, CEOs of state energy companies and acclaimed scientists who exchanged valuable information and good practices in an effort to raise awareness and to mobilise all relative parties with a view to promoting regional cooperation. The principal results of these exchanges are summarized here by focusing on the interplay of Climate Change and Energy Policy, the promotion of Natural Gas and the promotion of Renewable Energy Resources.

