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GREENING THE BLACK SEA SYNERGY


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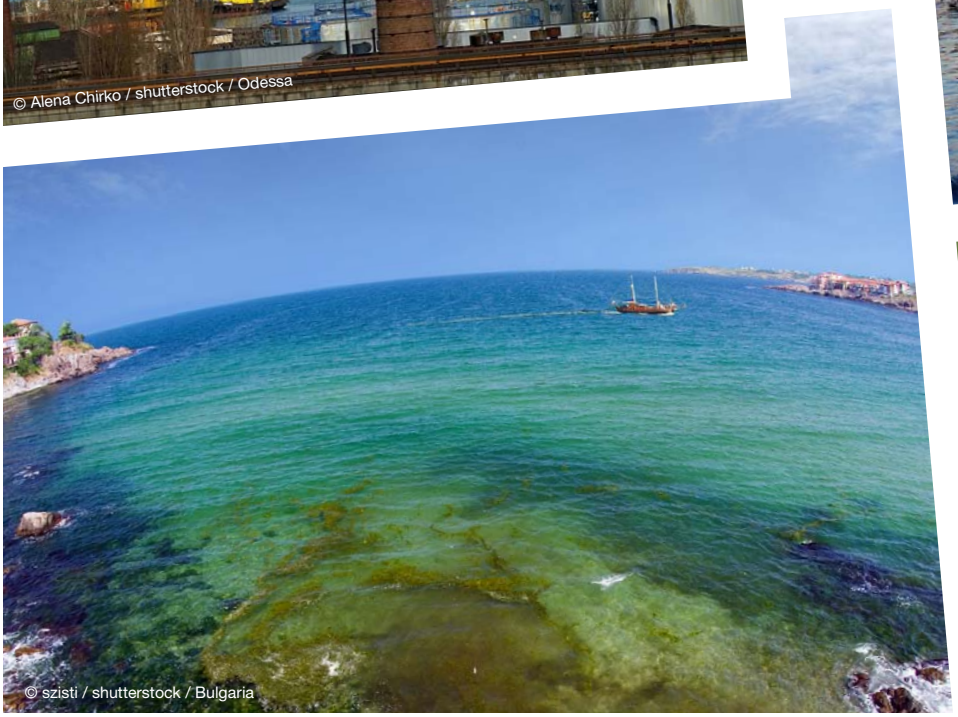
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Foreword

The Black Sea region forms a vital bridge between the East and West in terms of transport and energy supplies. It is a region of enormous geo-political sensitivity.

The latest round of enlargement of the European Union brings the EU right up to the shores of the Black Sea. The European Neighbourhood Policy has responded to this by developing the so-called Black Sea Synergy regional initiative. One particularly significant first step in enhancing regional co-operation under the new Black Sea Synergy was the Ministerial Conference in Kiev (February 2008). This was viewed by participants as 'the beginning of a long-term regional co-operation endeavor.'[1]

The Heinrich Böll Foundation (Hbf) and the World Wide Fund for Nature (WWF) welcome these developments. Regional co-operation in areas like economic development, security, energy, transport, tourism, and many others, must be undertaken in the specific context of the environmental values, natural resources and the sustainable and secure development and overall quality of life of the people in the regions concerned.

At the Kiev Conference, the Ministers made reference in their joint Declaration to "key priorities for regional co-operation." This included 'environmental sustainability'. The Ministers agreed to achieve a better co-ordination of environmental programmes. They mentioned in their Declaration issues such as climate change and the sustainable use of Black Sea resources as potential future areas for co-operation.

This joint publication by Hbf and WWF is a contribution to such an approach. It provides policy recommendations in the fields of energy, transport and security set in the context of the overwhelming importance of environmental factors. The recommendations have been developed together with civil society groups based in the Black Sea region.

We trust that further opportunities for participation will be stimulated by this report and will be routinely extended to civil society in the development of the Black Sea Synergy.

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1 http://ec.europa.eu/external_relations/blacksea/doc/joint_statement_blacksea_en.pdf

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Summary

The Black Sea Synergy (BSS) was initiated by the EU in 2007. It is a valuable attempt to promote a coherent policy approach towards EU's Eastern European Neighbours and to reinforce regional cooperation involving Member States, candidate and partner countries.

Developing and implementing a sustainable BSS is a major challenge in a context of rapid development of energy and transport infrastructures where energy security and strategic concerns turn the Black Sea Region into a "transit corridor" while often ignoring its outstanding cultural and natural values and potential.

At present, nor the energy, the transport or the security initiatives take enough into consideration their environmental impacts and potential sustainable alternatives. With the increased impact of climate change and the need for mitigation and adaptation, the strengthening of environmental cooperation in the Black Sea Region and the stronger attention and increased funding for environmental protection, integration and governance becomes a sine-quoi-non condition for the ecological viability of the region.

This study was initiated by Hbf and WWF with a view to informing the debate on EU policies and the forms which Black Sea cooperation might take in the future.

Introduction

The EU's 2007 enlargement brought the Union to the shores of the Black Sea. This prompted it to recognise the significance of the surrounding region as it launched a new initiative: the Black Sea Synergy.[1]

The Black Sea Region (BSR) is understood by the European institutions[2] to reach well beyond the sea's actual shores. It includes three EU Member States, Romania, Bulgaria, Greece, and one candidate state, Turkey. It also includes Russia, Europe's major strategic partner to the East and a number of countries identified as Europe's neighbourhood: Republic of Moldova,[3] Ukraine, Armenia, Azerbaijan and Georgia.

Together, these countries harbour a rich natural heritage, natural areas and landscapes which in themselves are hugely important to protect, and which are key for economic and social development. The mountains, forests, seas, coastlines and river floodplains of the region are still relatively intact and provide critical environmental services for local populations and national economies.

The BSR has become an area of particular interest to the EU not only due to the accession of Bulgaria and Romania but also because it is a transit area for oil and gas resources coming from Russia and the Caspian Sea. Due in part to its strategic importance, the area is also subject to political conflicts and tensions. Because of its location, strategic significance and natural resources, massive investments are expected, including EU funding to promote tourism, energy and transport infrastructure which, if not properly planned, could put in jeopardy the sustainable development of the entire region.

The region's natural wealth is indeed under severe pressure today. Marine resources in the Black Sea have declined due to over-fishing, pollution, unplanned development of coastal zones and intense maritime traffic, while unique terrestrial ecosystems, such as those in the Caucasus region, the Danube Delta and the East Carpathians are under threat. Land for growing food; forests for paper, pulp and construction; water for growing crops; rivers for navigation and coastal resources for commercial fishing and tourism; and continued demands for oil and gas extraction are just some of the resources under stress. In addition to this comes the daunting spectre of climate change impacts which will affect natural resource availability in unpredictable ways.

The Black Sea Synergy (BSS) is not a policy in the conventional sense. It rather aims to focus political attention onto the regional level and invigorate ongoing cooperation processes in the Black Sea Region.

The Ministerial conference held on February 14, 2008 in Kiev, involving the EU and Foreign Ministers from all the countries of the Black Sea Region, ratified a list of policy areas which the BSS will focus on, including in particular energy, transport, environment, migration and security.

The declaration further acknowledges "the role played by existing organisations and initiatives" and heralds the "beginning of a long-term regional cooperation endeavour" to work towards stability and prosperity in the region.

The Black Sea Synergy (BSS) thus appears to initiate a gradual reinforcement of the EU's involvement in the Black Sea Region, even as it announces priorities of considerable environmental significance, including the development of energy and transport infrastructure, international security and conflicts, natural resource management and environmental policy as such. The BSS, furthermore, cautiously suggests that the Black Sea Region, given the right support, may be a candidate for reinforced regional cooperation.

This study has been initiated with a view to informing the debate on EU policies and the forms in which Black Sea cooperation might take place. It aims to provide arguments to help make the Black Sea sustainable and to promote environmental protection as well as nature conservation in the entire region. This study is an integral part of the project "Greening the Black Sea Synergy", which also included an international WWF - Heinrich Böll Foundation workshop, which brought together NGOs from all Black Sea countries in Odessa, Ukraine, on February 5-7 2008.

The structure of this study reflects the BSS's priorities and the concerns of environmentalists. The first chapter surveys the region's natural wealth and major environmental challenges. Chapter 2 reviews the environmental challenges and opportunities associated with energy production, energy security and climate change. It outlines EU policies and initiatives of relevance in these fields and formulates recommendations accordingly. This section also addresses the likely impacts of climate change in the region. Chapter 3 deals with transport network developments, which are increasingly important for transit traffic between Europe and Asia, and their environmental effects in the region. Conflicts and security challenges are also a major concern for this area; the often complex linkages between them and the environment are examined in chapter 4. This section revisits the climate change issue as it addresses the possible future impacts of climate change on security. Finally, chapter 5, reviews the performance of existing regional institutions and multilateral initiatives in order to identify the means to enhance the effectiveness of regional environmental cooperation in the region.

1 See Appendix A for a list of EU initiatives in the region
2 COM (2007) 160 final, footnote 1, p 2.
3 Hereafter the Republic of Moldova is referred to as Moldova.

Chapter 1 / THE ENVIRONMENTAL STATUS OF THE BLACK SEA REGION

1.1 / The Black Sea's natural context

The Black Sea's catchment area is very large, with a total surface of around 2 million km², five times the surface of the Black Sea itself and a third of (non-Russian) Europe's land mass. Some of Europe's longest and largest rivers flow into the Black Sea and into the Sea of Azov, including the Danube, the Dnieper, the Southern Bug, the Dniester and the Don. The area is inhabited by a total population of around 160 million people (BSEI, 2005). Though rather less densely populated than Western Europe, it includes some of Europe's population and industrial centres in Western and Southern Ukraine, in Russia (Rostov on Don, Krasnodar, Smolensk), in Istanbul and in central Europe (Austria and Slovakia).

The Black Sea itself covers an area of 423 000 km², not including the 37 860 km² of the Azov Sea, and its immediate coastal areas are home to about 16 million people[1] (BSEI, 2005). The region is an economic hub, and a focus for international trade between the countries on its shores. History bears witness to the Black Sea's role in trade and therefore traffic: the ancient Greeks, the Eastern Roman (Byzantine) Empire, the Ottoman and more recently the Russian Empire have ruled all or most of the territory surrounding the sea. Until 1990, it was largely surrounded by Warsaw Pact countries, with the Soviet Union to the East and North and communist Romania and Bulgaria to the West.

The area is mountainous in the East and South, in the Caucasus and in Anatolia; and to the North West, with the Carpathians in the Ukraine and Romania. Most of the rest of the Black Sea's western and northern neighbourhood is low lying.

The region's natural ecosystems include forests in the West, South and East, steppes to the North, and Alpine ecosystems at higher altitudes in the Carpathians, in Anatolia and in the Caucasus. Areas of greater natural and biological diversity within the Black Sea Region include in particular the Caucasus, Crimea, Anatolia, the Carpathian mountains, the estuary of the Danube and other wetlands. Both the Caucasus and parts of Anatolia are furthermore considered by the European Environmental Agency as "biodiversity hotspots", because they combine a particularly rich biodiversity and an alarming rate of habitat loss (EEA, 2007). Economic activity remains limited compared to Western European standards. GDP per capita is below $9 500 (adjusted for purchasing power) in all countries concerned, and below $4 500 in Moldova, Ukraine, and the three South Caucasian Republics. After a drop in the 1990s, GDP has now recovered to levels comparable to pre-transition income in most countries, but industrial production has not. EEA indicators show correspondingly lower levels of energy consumption, air pollutants and waste production for the countries of the region than in Western Europe: Ecological Footprints for these countries range from less than 1 ha per person in Georgia to 3.3 in Ukraine, 4.5 in Russia, and 5 in the EU (UNEP/EEA, 2005).[2]

The Black Sea basin

Map of The Black Sea basin. (2001). In UNEP/GRID-Arendal Maps and Graphics Library. Retrieved 10:39, March 4, 2008 from http://maps.grida.no/go/graphic/map_of_the_black_sea_basin.

1.2 / Environmental services and the economic value of the region's natural assets

The Black Sea Region's natural heritage is of particular interest to Europe. Much of it is exceptionally rich and diverse, and has suffered from industrialization and urbanization rather less than other parts of Europe. The area's natural environment also provides a range of products and services, most of them of direct economic value, which are vulnerable to disruption.

1 In addition to the 17 million people living in Istanbul

2 According to the EEA, "Ecological Footprint accounting measures the extent to which the ecological demand of human economies stays within or exceeds the capacity of the biosphere to supply goods and services." It is expressed in terms of the surface that would be required to sustainably provide the environmental services and resources consumed.

The most obvious of them is the provision of freshwater: the Danube's discharge alone amounts to more than 200 km^3 yearly. The region's populations are dependent on continued freshwater supplies for human consumption, agriculture and industry. Many rivers also provide renewable energy in the form of hydroelectricity and major rivers are an essential part of the continent's transport infrastructure.

Forests provide timber; the vast forests stands of Ukraine for instance yield 1.3 billion m^3 of timber yearly. Forests also provide fuelwood, particularly in the poorer and rural parts of the region.

Forests and a number of other habitats also provide a wide range of non-timber products, both food (such as game or mushrooms) and non-food products, notably medicinal plants which continue to be widely used. Around 1100 such plants have been identified in Ukraine alone for instance. Honey production is particularly dependent on natural ecosystems and on the diversity of wild flowers (EEA, 2007).

Forests naturally play an important role in regulating the local climate and the water table as well as in protecting soils. This is particularly important in areas exposed to a number of simultaneous pressures on ecosystems. The effects of deforestation are especially dramatic in mountain areas.

Sea and freshwater fish are a major resource, exemplified by the well-known case of the sturgeon. More generally, the region's genetic and biological diversity represents an indispensable, albeit non-commercial, resource. The South Caucasus and Anatolia for example, are the natural home of an impressive range of food crops, which includes wheat, rye, oats, hazelnuts, tea and various forage legumes and fruit - 83 species in all. The wild varieties which live in the area constitute an important gene pool for their domesticated cousins (EEA 2007).

Finally, the natural attractiveness of many parts of the region, especially mountain and coastal areas, render them attractive to tourism and recreation. Tourism is already thriving on the Black Sea coast, in Romania, Bulgaria, Ukraine and Russia, and increasingly so in mountain areas from the Carpathians to the Caucasus.

1.3 / Threats and pressures

The main pressures on the region's environment can be summarised as habitat disruption, degradation and fragmentation, introduction of alien species, overexploitation, pollution and eutrophication (OECD 2007).

Forests are under threat from excessive and often illegal logging or harvesting for fuelwood (e.g. in Russia and the Caucasus).[3] Forest fires are frequently the consequence of land use changes, of climate change and of the under funding of forest services (EEA, 2007). The restitution of state-owned land to private owners is considered a threat to forest preservation in Ukraine and Romania as it is feared that many private owners would tend to log them for short term profit. Hunting and poaching are a widespread problem too, and are of particular significance for large mammals and birds. In the Black Sea and spawning rivers, overfishing continues to be a major issue mostly driven by poverty and international demand for black caviar (WWF ERCP 2005).

Intensive agriculture has historically been a major cause of habitat loss, especially in the large agricultural area of Ukraine, Romania, Moldova and in coastal lowlands. Irrigation can damage soils and lead to salinization (EEA 07) while agricultural runoff and organic pollution from other sources is responsible for eutrophication in rivers, lakes, wetlands and seas. Overgrazing remains widespread in such areas as Romania and the Caucasus. In some case, such as in Ukraine, a drop in investment in the 1990s and a 50% drop in the use of chemical inputs have resulted in reduced pressure from agriculture (OECD 2007).

River management, the construction of waterways and the draining of wetlands are a serious problem, damaging ecosystems, disrupting the regime of rivers and altering the water table. This is a major cause for concern for the large rivers such as the Danube and Dniepr.

Along the Black Sea coast, urban, industrial, transport, tourism and port infrastructure have damaged ecosystems and provoked erosion. The development of tourism is going to be a threat in a number of areas, including the Carpathians and other mountain areas, while large scale infrastructure projects such as the Baku-Ceyhan pipeline across the Caucasus and Turkey have particularly damaging consequences for habitats.[4]

Invasive species are a widespread and increasingly recognized problem. The aquatic environment, the Black Sea in particular, is especially vulnerable in this regard. In Moldova, the introduction of higher yield fish species has reduced the stock of, or displaced, indigenous species. Overall, the number of "worst invasives" tends to be somewhat lower than in other parts of Europe (EEA 2007).

Nuclear contamination has affected vast areas, an estimated 3.5 million hectares in Ukraine, and large parts of Moldova.

3 For example, in Eastern Anatolia the amount of timber and fuelwood taken from forest is nine times higher than forest productivity (WWF, 2006)
4 Chapter 2 provides a more detailed account of the environmental effects of infrastructure projects.

The effect of industrial pollution is already present, especially in Ukraine, Russia and Romania. Industrial pollution has affected wildlife via toxic pollution, nutrient pollution, waste dumping and industrial accidents. Generally speaking, industrial pollution decreased in the 1990s, and long-range air pollution has stabilized in this region as in the rest of Europe (OECD 2007).

Climate change, finally, will add to other pressures on ecosystems in the Black Sea Region as elsewhere. Its impact is likely to be particularly severe from the point of view of endangered and endemic species in Alpine areas such as the Caucasus, where the size of some high altitude habitats may be reduced.[5]

Pollution in the Black Sea Area. (2001). In UNEP/GRID-Arendal Maps and Graphics Library. Retrieved, March 4, 2008 from http://maps.grida.no/go/graphic/pollution_in_the_black_sea_area.

1.4 / The Black Sea's regions

The marine environment

The environmental status of the Black Sea has been the subject of major environmental concerns since the early 1990s. This has led to the signing of the Black Sea Convention in 1992.

While its vast catchment area spans much of Europe, the Black Sea is linked to the world's oceans only by the narrow passage of the Bosphorus. It is a deep sea, reaching down to more than 2 000 m in places, but 87% of its volume, below 100 to 200 m in depth, is anoxic and can therefore support only a very limited range of specialised life forms. Its marine life is made up mostly of Mediterranean species. It hosts about one third as many species as the Mediterranean Sea but its productivity is considerably greater.

The sea's main environmental problem is eutrophication, caused by the excess of nutrients flowing via rivers or directly from coastal areas into the sea. The Danube on its own is by far the main source of nitrogen, phosphorus and suspended solids. Its nutrient load originates from agriculture and sewage running into the river and its tributaries over a vast, developed, and relatively densely populated catchment area. The nutrient discharge, which increased drastically after the 1960s, has begun to decline however.

Eutrophication is widespread in the Black Sea, but its effects are more pronounced on some areas, such as in the North West, in the vicinity of the Danube delta. Eutrophication generally, and its more severe episodes in particular, contribute to the degradation of natural systems and of their biodiversity (EEA, 2002, EC, 2001).

The Black Sea's fish stock has declined drastically in recent decades. Catches dropped from a high of about 800 000 tonnes yearly for all species in 1984 to a low of 250 000 t/y in 1991, causing considerable economic losses to the fishing industry in the region. Catches have since recovered somewhat, but remain well below their earlier levels and well below the estimated maximum sustainable yield for the Black Sea. The drop in fish stock is a result of overfishing, pollution, eutrophication and of habitat loss (EC, 2001; EEA, 2002, BBC, 2007).

Overfishing has also altered the presence of various fishes in the Black Sea. Only five of the original 26 species of fishes which were under exploitation in the 1960s were still commercially exploited in the 1980s, as commercial fleets moved on to other species once fisheries had been exhausted. Sturgeon fisheries have, for example, been dramatically depleted and all sturgeon species are considered endangered. Today, anchovy and sprat remain the main commercial species in the Black Sea and together make up about 80% of catches (PCT, 2008).

In the relatively closed Black Sea, the increasingly frequent introduction of alien species, either intentionally for aquaculture, or accidentally in ballast waters and on ship hulls, has also played havoc with native species and ecosystems (EEA 2002 (b)). The most dramatic example in this regard is the jellyfish *Mnemiopsis*, presumed to have been introduced via ballast waters: with no predator in the Black Sea, it has reproduced exponentially and, at its peak, reached an estimated total mass of 1 million tonnes. The mass of decaying dead individuals had become an environmental

5 Chapter 3 analyzes the impacts of climate change in the region.

issue in its own right. Only the subsequent introduction of *Beroye ovata*, a predator of the jellyfish, fortunately limited its numbers.

Accidental pollution is also noted as a significant problem affecting the Black Sea, particularly oil spills, which cause considerable damage in the vicinity of ports and industrialized areas. Waste dumping remains a problem, and discharges from both residential and industrial sites result in contamination by heavy metals, oil and derivatives, persistent organic compounds or radionucleides (EC, EEA (b)).

Romania and Bulgaria

On the Black Sea's western shores, Romania is at the confluence of a number of biogeographical regions. 28% of the country is still covered by forests, including some of the largest undisturbed forests in Europe. Overall, 47% of Romania is covered by natural or semi-natural areas, a high figure by European standards, though some of them are degraded. Its nature reserves represent 7% of the country. Agriculture covers much of the country's surface, and most of the country's low-lying areas, and little remains of the country's original steppes. 60% of the Carpathian Mountains (Box 2) and 75% of the Danube delta (Box 1) are in Romania. The country, and particularly its eastern part, is also particularly important for bird migrations. It boasts 3 700 vascular plants, though up to 37% are considered either rare or endangered, as well as 364 species of birds, 102 mammals and 191 fish species.

Important threats for the environment in Romania include pollution, river damming and management, the drainage of wetlands, industrial agriculture, tourism and infrastructure projects and other forms of exploitation of natural resources. Romania is among those countries affected by the likely environmental impact of land restitution. As much as 30% of the country's forests are due to be returned to the private sector, and environmentalists anticipate that 20% of that might be cut down.

Bulgaria also includes a diversity of habitats from the Balkan Mountains in the West and South to the Black Sea coast. Overall, 35% of the country is forested, 60% of which are of natural origin. The country reports upward of 3 550 vascular plant species, 383 birds and 207 fish species (Black Sea fish included), with a rate of endemism of 5%.

Bulgaria's environment is exposed to a wide range of threats, including pollution, the excessive exploitation of natural resources, invasive species and land restitution policies. Like other countries in the region, Bulgaria suffers from inadequate awareness of the value of and threats to biodiversity, from an inadequate knowledge base, and from the poor enforcement of conservation laws.

[Box 1] The Danube river and its delta

The Danube with 2 857 km is the longest watercourse in Europe and has the largest watershed - 817 000 km^2 or one third of Europe outside Russia, home to 83 million people in its watershed. The basin includes much of Romania, Austria, Slovenia, Hungary, Croatia, Slovakia, Ukraine and parts of Bulgaria, Germany, the Czech Republic, Moldova, Serbia, Italy, Switzerland, Albania and Poland.

The river is bordered by a number of wetlands of particular importance. The Donau-Auen National Park, for example, together with other wetlands on the lower Morava and Dyje in Austria, the Czech Republic and in Slovakia, form a transboundary wetland of international importance; the Neusiedler and Ferto-Hansag transboundary National Park is a World Heritage Site; a number of other sites of comparable value border the river, all the way to, and including, the Danube delta. The economic contribution of these wetlands has been valued at 450 to 520 $/ha/year (WWF, undated).

The upper Danube tends to be more industrialized than the rest of the river, and much of this stretch of river is no longer free flowing. The relative preservation of the river's middle and lower reaches has allowed the conservation of riches lost in most other European river systems. Over the course of the entire river, WWF nevertheless estimates that 80% of the river's wetlands and floodplains have been destroyed in the course of the last century.

The river and its vicinity are home to 330 species of birds, with 223 of them on the red list and strictly protected. 60% of the White Pelican's range and 70% of the Pygmy Cormorant's nesting areas are in this area for instance. The river also has 103 species of fish, seven of them endemic. But 5 of the 6 sturgeon species present in the Danube are either extinct or nearing extinction, including the Beluga Sturgeon.

The river and the many wetlands that border it have been modified by water extraction for agriculture, industry and human consumption, by the construction of dams for river control and by the drainage of wetlands. The Danube's course is thus interrupted by no less than 59 dams. Since 1992 the Gabcikovo dam for instance diverts 80% of the river flow away from the riverbed for 40 km and into a side channel, thus severely affecting surrounding wetlands.

Additionally, the Danube's very high nutrient content results from runoff from agriculture (about half the load), industry and households (about a quarter each). Heavily urbanized and industrialized in places, the Danube is also affected by heavy metal and bacterial pollution, as well as by industrial accidents.

The Danube delta (a World Heritage Site and protected area) is the largest delta in Europe after the Volga's. It is of very high conservation value and highly vulnerable. Its 5 200 km^2 combine various biota including reed beds and swamps, lakes and networks of canals, forests, meadows, sandy grasslands and dunes, 3 733 km^2 of which are protected. It is host to 300 species of birds, 3 400 insects, 1200 higher plants and is a stopover for 25 million migrating birds.

The delta as well as the river's lower course are today at risk from water management projects, including drainage, irrigation and damming projects. 15% of the delta has already been drained. The proposed Bystroye Canal in the Ukrainian part of the Danube delta, represents a particularly grave threat to the area. In the lower course a Danube modification project between the towns of Calarasi and Braila is now envisaged, which would alter the course of the Danube in Romania over a stretch of approximately 200 km to facilitate navigation. This project and the transboundary Bulgaria-Romania project, also on the Danube, may have likely significant environmental impacts by affecting notably the main spawning grounds for sturgeon (WWF[6]).

These plans and others are believed to be a threat to many of the areas that are to be protected either under EU conservation legislation or under the Ramsar (Wetlands) Convention.

Wetlands around the Black Sea and the Azov Sea

Ukraine and Moldova

Most of Ukraine (96% of the country's area) and Moldova are inside the Black Sea's watershed. The region's natural vegetation includes forests, forest steppe and steppe. Ukraine shares with Romania the Carpathian Mountains (Box 1) and the Danube delta (Box 2).

As an illustration of both countries' biodiversity, Ukraine (600 km^2) is host to an estimated 5 100 species of vascular plants and Moldova (34 km^2) to around 2 000. The richest parts of the region from the point of view of biodiversity are the Carpathians, the Danube Delta and the Crimea.

Ukrainian and Moldovan economies rely heavily on agriculture. 57% of Ukraine and 75% of Moldova's territory are farmed, though substantial stretches of forests also remain: about 14% of Ukraine and 9% of Moldova (the European average is 29%). Natural and semi-natural areas are also estimated at around 20% of the country in Moldova and 29% in Ukraine.

Soils have suffered from agricultural exploitation causing nutrient loss, erosion and chemical pollution. Erosion affects 18% of Ukraine and floods 17%. 11 to 25% of its irrigated lands suffer from secondary salinization.

Land restitution is an issue in Ukraine and in Romania, as comparatively well preserved state-owned areas are due to be returned to private owners, causing fear that many of those new owners will put them under exploitation and cause environmental damage.

Infrastructure and river management projects are an issue in Ukraine as well. As a result of the dams at the Dniepr cascade, water table levels have risen from 2 to 12 meters, causing flooding. The construction in the 1980s of a dam at Novodnestrovsk on the Dniester had a particularly severe effect on river regulation, causing *inter alia* a dramatic drop in the river's productivity.

6 http://www.panda.org/about_wwf/where_we_work/europe/what_we_do/danube_carpathian/our_work/freshwater/sustainable_navigation/bottlenecks/index.cfm

[Box 2] The Carpathian Mountains

The Carpathian Mountains are a comparatively well preserved area of high biodiversity value, close to the centre of Europe. They are in the Black Sea catchment area, and 90% of their waters run to the Black Sea (the rest runs North to the Vistula and the Baltic) (CEI, 2001).

Covering a total surface of 209 256 km^2, this mountain range is shared between seven countries, including Romania and Ukraine to the East. With an area larger than the Alps and roughly five times the size of Switzerland, it contains the largest tracts of mountain forests in Europe.

Like the Caucasus, it is at once a bridge and a barrier between regions to the North and South. Its mountainous terrain has so far largely preserved the area and its biodiversity from intensive exploitation. With 3 988 vascular plant species, more than 10% endemic (481 species), it boasts one-third of all the vascular plant diversity of Europe. Its macro-fauna is uniquely preserved, with numerous large herbivores and carnivores, including wolves, bears and lynx in much greater numbers than in the Alps or other parts of Central and Western Europe.

Carpathian forests are extensive, and comprise both deciduous and evergreen, pristine and managed forests. The area covered by pristine forests, an estimated 300 000 ha, is unique in Europe. Altogether, the area covered by forests of any type is considerable, ranging from a minimum of 30% in Hungary to as much as 60% in Romania.

Threats to Carpathian forests include timber exploitation and overgrazing. While pressure on forests and on open habitats in the Carpathians has been limited during the Communist era, the restitution and privatization of land, combined with the introduction of more intensive forms of forestry, expose forests to new pressures.

The Carpathians also include a range of natural and semi-natural open habitats, mostly grassland, which make up specific ecosystems and host much of the region's biodiversity. Those linked to traditional lifestyles, such as shepherding, are modified or threatened. As is the case for forests, the trend towards land fragmentation, the introduction of modern agricultural methods, as well as infrastructure or industrial projects are important factors of transformation in an area which suffered from benign neglect during the Communist era.

Crimea

Crimea is mostly lowlands, but also features a small mountain range near the coastal area. Its natural biota includes forests, steppes and coastal ecosystems. Its biodiversity is high for a relatively small area, with 2 775 species of vascular plants, 279 of them (about 10%) endemic, 301 species of birds (5 endemic, 50 endangered) and 57 mammals (15 endangered). All four of its marine mammals (seals and dolphins) are endangered.

Notwithstanding this biological wealth, Crimea has been deeply affected by human presence. Only 2 to 3% of its habitats are unaltered, and 62% of its land is either under cultivation or urbanized. The remaining 35-36% of the land is covered in forests or pastures. 83% of its biodiversity is to be found in Crimea's mountains and, to some extent, in coastal areas. The Crimean steppe as a biota, while comparatively species-poor, is under a more immediate threat due to its accessibility. Crimea's 137 protected areas cover 5.6% of its territory (142 462 ha).

Crimea's environmental challenges are characteristic of a low-lying, relatively densely populated area exposed to human exploitation. Its ecosystems are affected by hydrological change caused by irrigation or conversely by the lowering of the water table. They are also affected by reductions in habitat size, habitat fragmentation, land use changes and encroachment by farms and urban areas. Pesticide and fertilizer residues contaminate the aquifers and rivers. Overgrazing, illegal logging for domestic needs, uncontrolled medicinal plant harvesting and poaching also contribute to the overall degradation, as do forest fires.

The area is close to Ukraine's industrial centres and has been affected by pollution from chemical plants in Krasnoperekopsk and Armyansk since the 1960s and 1970s. (BSP, 1999). Pressures resulting from the growth of towns and cities, from tourism and shipping, have also taken their toll. Specifically, the current construction of an oil terminal on the Taman peninsula has caused environmental concern. Once in operation, terminals may cause water and air pollution, as well as soil contamination, thus creating environmental health problems and threatening local fisheries.

The Caucasus

The wider Caucasus ecoregion, on the Eastern edge of the Black Sea, encompasses the lowlands to the North and South of the mountain ranges. It is an area of very high biological diversity and has been classified as a biodiversity hotspot on account of its conservation value and of the seriousness of the threats its habitats face.

The area includes the entire territories of Georgia, Azerbaijan and Armenia, but also the Russian Caucasus, and parts of North Western Iran and North Eastern Turkey. The mountainous terrain, situated in a narrow isthmus between the Black Sea and Caspian Sea to the West and the East, links Russia and the North-Asian landmass, to the Middle East and Anatolia.

There are 6 500 species of vascular plants in the Caucasus, a quarter of them endemic: the area has the highest level of endemism in the temperate world. It also has an unusual level of animal diversity, including 400 species of birds, 77 reptiles and 200 fish (one third endemic). Its 153 mammals (20% endemic) include large herbivores and carnivores such as the Leopard, the Red Deer and the West and Eastern Caucasus Turs (WWF, 2006, EEA, 2007).

9.8% of this eco-region's territory is formally protected as nature reserves, parks or sanctuaries but the system of protected areas in the region is patchy, underdeveloped and poorly administered. The distribution of protected areas is random, and they are rarely connected to allow species to migrate.

The eco-region's biodiversity is now being eroded at an alarming rate. About half its lands have been modified, and less than 12% of habitats can still be considered untouched.

The region's population is 35 million in an area the size of France (580 000 km^2). With a population density of 66 person/km^2, widespread poverty and the industry sector still suffering from the economic collapse of the 1990s, anthropogenic threats to natural habitats originate mostly from illegal logging, fuelwood harvesting, overgrazing, poaching and wildlife trade, overfishing, infrastructure development, habitat fragmentation and the polluting of rivers and wetlands.

These problems can be ascribed to socio-economic problems, to the lack of administrative and enforcement capacity and to a general lack of awareness. But the region is also concerned by oil and transport infrastructure projects which fragment habitats, cause disturbance in previously isolated environments, and occasionally create localized population booms. There is concern, too, about the infrastructure required for the Sochi Winter Olympics and the plans to build the Russia-Asia canal.

The Caucasus has already lost substantial areas of forest, but a fifth of its territory nevertheless remains forested (EEA 2002b). These are mostly mountain, less frequently lowland forests and they harbour much of the region's biodiversity.

Logging is a major cause of forest loss in all of the region's forests. Illegal logging in particular has increased, while officially sanctioned logging has decreased in recent years. In Georgia experts believe that illegal logging accounts for three times more than the official quotas In Armenia, 8% of forests were cut down, mostly for fuelwood, during the energy crisis between 1992 and 1995 (WWF, 2006) .

Overgrazing is also a major threat to forests and to their regeneration, as it is to open grasslands (one-third of the region) and to alpine ecosystems in the Caucasus.

High-mountain ecosystems cover 17% of the region and have a high conservation value, with numerous rare and endemic species in Alpine meadows or rock and scree habitats. These fragile biota are also under heavy pressure from overgrazing and from the excessive collection of plants for medicinal and other purposes. Overgrazing in alpine meadows not only contributes to denudation and soil erosion, it also changes the species composition of the vegetation.

Poaching is a menace in all high-mountain ecosystems, whether forested or not, and carnivorous and herbivorous mammals (bison, red dear, saiga, brown bear, bezoar goat, etc.), reptiles and other species are hunted for skins, trade, medicinal and laboratory purposes, or for collectors and trophies.

To the North of the Caucasus range, steppes with their specific vegetation and fauna used to be widespread but, following their conversion to agricultural land, only fragments remain. To the South, semi-deserts represent limited and unique habitats. They have also been largely transformed by irrigation and winter grazing, as is the case in the South of Armenia.

Only part of the Caucasus area belongs to the Black Sea watershed; the rest flows towards the Caspian. Almost 12% of the Caucasus is covered by waterways and wetlands, the largest among them being lake Sevan, a Ramsar Convention site. Caucasian wetlands, particularly along the coast, are important stopovers for migrating birds. Numerous species of birds stop over during migrations or winter in the wetlands along the Caucasus Black Sea coast.

Fishing, much of it illegal, is a major problem in lakes, rivers and wetlands, particularly for such a prized and slow maturing catch as the sturgeon. Chemical pollution from agriculture has declined as the use of artificial fertilizers and pesticides declined too. Soil erosion and waste and manure dumping in or near rivers are a persistent threat and contribute to pollution and turbidity. Industrial pollution has also been reduced as most of the region's industries closed down in the 1990s, but even so, the lack of capacity, environmental awareness or administrative oversight lead to disproportionate pollution from small and medium-size businesses.

The Black Sea coast of Anatolia

Anatolia is another large and mountainous area bordering the Black Sea that is remarkably rich in biological diversity. With around 10 000 higher plants reported in Turkey as a whole (3000 endemic, compare with 12 000 for the whole of Europe), its biodiversity compares to that of the European continent.

Turkey's Black Sea Region (18% of the country's surface) is a steep and relatively narrow strip of territory stretching from Georgia to Istanbul and the Sea of Marmara. High mountains (with peaks at 2000 m in the West and Centre and 3000 m in the East) slope down steeply to a relatively narrow coastal strip and the area features a number of deltas and wetlands. This northern area is both damper and more densely forested than the rest of Turkey and its temperatures are milder than in continental Anatolia. It thus shares many of the characteristics of the Black Sea coasts of Bulgaria, Romania and Georgia.

More than 50% of the BS region is covered by forest, which is substantially more than the rest of Turkey, where 27% is forested. The natural vegetation ranges from rare temperate rainforest and deciduous mountain forest to coastal lowland forests (Colchic forests), peat bogs and coastal sand dunes. The region is particularly rich in woody species and harbours a considerable population of large mammals such as the brown bear, jackal, lynx, red deer, roe deer or chamoix. It is important for migratory birds, with a number of important areas for birds around estuaries and wetlands, a main migratory route to the East of the Black Sea, continuing along the Georgian coast, and another route across the Bosphorus to the West.

Unfortunately, very little remains of the original Colchic forests, which have been decimated by logging and the quest for agricultural land. A number of wetlands have also been drained for the purpose of extending areas available for cultivation and most of the region's productive lowlands are now under cultivation. Urbanization, including the construction of building infrastructure, and the construction of highways, add to the pressure on the region's ecosystems. Hunting and poaching are also threats to wildlife.

To the West of the Bosphorus, the region features Europe's largest stretches of rare heathland, 95% of which have been destroyed by a combination of urbanization and afforestation, yet the remaining area nevertheless retains considerable ecological value. Much of the region in the vicinity of Istanbul, on both sides of the Bosphorus, is under severe pressure as a result of the metropolis's expansion.

1.5 / International initiatives and the protection of biodiversity

From the point of view of nature protection, Black Sea countries are concerned by a number of international as well as specifically European agreements and cooperation processes.[7]

Their overarching framework remains the *Biodiversity Convention*, which all countries in the region have joined and ratified, and notably the Convention's (2005) Programme of Work on Protected Areas. The Programme of Work's overarching goal is the establishment of networks of protected areas on land by 2010, and at sea by 2012. The *Ramsar Convention* is also of particular relevance to the area, considering the large number of wetlands of high biodiversity value, particularly around the Black Sea and along the Danube and other rivers.

The *Environment for Europe* (EfE) process has been promoting the cause of integrated networks of protected areas towards the establishment of a Pan-European Ecological Network. In this context, the 2003 *Kiev Declaration* identified targets for all European countries aiming both at the establishment, by 2008, of networks of protected areas and at the designation of High Nature Value agricultural areas which ought to be the object of measures to ensure that agricultural practices are compatible with the conservation of wildlife (EEA 2007).

While the European Union is implementing the Kiev principles via the *Natura 2000* network, in non-member states one of the main vehicles for their implementation is the *Emerald Network* promoted under the *Bern Convention* on the Conservation of European Wildlife and Natural Habitats.

All countries in the Black Sea Region are part of the Environment for Europe process and hence formally signed up to the Kiev principles. Though the Bern Convention has not yet been ratified by Armenia, Georgia and Russia, all countries in the region are part of the Emerald Network and are actively involved in projects to set it up.

Since their accession to the EU, Romania and Bulgaria are formally covered by the Natura 2000 and the *European Union's Biodiversity Strategy* whose goal is to halt the loss of biodiversity by 2010. Turkey is also gradually adapting to EU requirements for nature protection. In due course, roughly half of the length of Black Sea coast and half of Black Sea coastal states will thus come to be covered by EU legislation.

7 For a more detailed analysis of regional institutions dealing with the environment, see chapter 4.

In addition to the global framework for nature conservation, several sub-regional level initiatives are of particular relevance to the region. The *Danube Convention* covers pollution reduction, prevention of accidental pollution and habitat protection issues and has provided a strong framework for cooperation between countries bordering the Danube.

The *Carpathian Convention*, signed in 2003, commits its seven state parties, including Romania and Ukraine, to nature protection and sustainable development in the Carpathian Mountains. It is notably the first international agreement that explicitly calls for the establishment of ecological networks and for the integration of biodiversity conservation in development planning.

Like the Danube Convention, the *Black Sea Convention* (see in Chapter 5) is a relatively old international agreement specific to the region. Its environmental program organises conservation work in habitats that are critical for populations of priority species (Bonnin 2007). The Convention regulates, and the Black Sea Commission coordinates, policy on a range of issues including the management of marine resources, integrated coastal zone management, accidental pollution, pollution from ships and from land, hazardous substances, waste dumping and atmospheric pollution.

The Caucasus is not covered as such by international agreements or formalized international environmental cooperation. But its Regional Environmental Centre in Tbilisi, whose board includes representatives of the three governments of Armenia, Azerbaijan and Georgia, represents a unique, though often laborious, experience of intergovernmental cooperation in the service of capacity-building in the environmental sector. The WWF's Ecoregional Conservation Plan (ECP) for the Caucasus also provides for a process of regional cooperation.[8]

1.6 / Challenges to conservation policy

Establishing networks of protected areas

The countries in the Black Sea Region have made some progress towards developing more effective conservation policies and implementing international commitments, such as the Kiev principles. Efforts to recognize and protect the natural environment have, however, been confronted with serious limitations.

Overall, the extent of protected areas varies, but still falls significantly short in comparison to Western European figures (GEO 2000), with a low of 3% of national territory in Turkey for instance. A rapid growth in protected areas is still to be detected in countries like Azerbaijan or Bulgaria (OECD 2007, WWF 2006). It is also true that plans are proceeding with the identification of Pan-European Ecological Networks (PEENs) and a network has already been identified in the Caucasus (Bonnin, 07).

The Kiev declaration also required that all European countries identify areas of farmland with high conservation value, so called "High Nature Value" Farmlands. But most countries in the region have not fulfilled their commitments from this point of view (OECD 2007, EEA 07). Likewise, little action seems to have been taken in the region to tackle the challenge of alien species.

Legislation concerning nature protection is considered generally adequate in most countries and most concerns focus on the conditions of its implementation (WWF, 2006). Even in the new EU members, Romania and Bulgaria, nature protection legislation is not necessarily enforced, as illustrated by plans to build tourism or transport infrastructure on protected areas, often in defiance of EU conservation legislation.

Capacity and funding

The wide gap between laws and stated policy on the one hand, and implementation on the other, is partly the result of the lack of political support and resources available for the enforcement and management of protected areas.

Funding for conservation is generally low, and capacity and resources are lacking. Training, skills, infrastructure and equipment are in short supply and salaries and employment conditions are unattractive. As a consequence, the effectiveness of those institutions charged with implementing conservation policies at all levels is seriously limited. As a result of the low availability of national funding, dependence on foreign sources is widespread, and the contrast between those areas with access to international funding and others can be marked (WWF 2006, OECD 2007).

Environmental awareness

The lack of awareness of the value of biodiversity, of the services it renders and of the consequences of its degradation is also of considerable significance to the region. Among the general public and the political class, this translates into a low prioritization of nature conservation, resulting in little effort being invested in the enforcement of legislation or in providing adequate funding towards conservation. Among stakeholders, it translates into a weak social control of particularly damaging behaviour, such as illegal construction sites, poaching or logging, which make the enforcement of legislation much more difficult.

8 WWF/Williams L. (ed). *An Ecoregional Conservation Plan for the Caucasus*. Tbilisi, May 2006. Available online at: http://assets.panda.org/downloads/ecp__second_edition.pdf

Awareness of the costs of degradation of the natural environment, by contrast, is essential to obtaining the support of local communities for conservation projects and to promoting practices compatible with conservation.

Governance

Countries where administrative capacity is weak, funding scarce and policy as well as legislation poorly understood, are particularly vulnerable to corruption. Where corruption is rampant, business interests are in a position to override legislation and undertake projects that conflict with nature protection policy. The issue is clearly central to efforts aimed at reinforcing the rule of law in general in most countries of the area. Corruption can be particularly difficult to tackle, and its effects can become extremely damaging when higher levels of government authority are affected.

1.7 / Conclusions and recommendations

A considerable part of Europe's natural heritage surrounds the Black Sea. Much of the BSR hosts species and habitats that have disappeared elsewhere, or that are unique to these areas. But the region faces major environmental challenges: some of them inherited from the past or due to the hardship that most of the region's countries underwent after the collapse of the communist regimes, but some may result, or already result, from new developments. These different environmental challenges call for different forms of international response.

Where environmental pressures affect a collective resource, such as fisheries or a shared watercourse, international cooperation should focus on its shared management: this applies to the Danube river and its watershed, or to nutrient pollution and fisheries in the Black Sea.

Conservation also requires international coordination to the extent that it deals with natural systems that are shared by several countries, such as the Caucasus, the Carpathians or the Danube delta for instance. In spite of undeniable achievements, regional environmental cooperation is still in the early stages of its development in the Black Sea Region.

But the region also remains economically under-developed, and poverty, poor administrative capacity and inadequate legislation constitute major problems as they lead to the inadequate management of resources exemplified by poaching, illegal logging and overgrazing. These pressures affect, first and foremost, local resources, although their cumulative effect may affect resources on a national or regional level. Improving capacity and governance locally and nationally is key to tackling them. International cooperation can contribute significantly to building capacity through the exchange of best practices and through assistance. International support is of course already being provided and should continue to be available in this field. In the years to come the development of domestic capacity will depend primarily on the determination and capability of each of the region's governments.

In addition, the economies of all countries in the region are growing, some of them quite fast. Industrial and urban development and infrastructure projects, stalled in the 1990s, have resumed and will increasingly add to environmental pressures. This is of particular concern where those promoting such projects have access to vast resources and influence, out of proportion with those available to local administration and conservation authorities. A strategy for sustainable development in the Black Sea Region must anticipate these developments too.

Recommendations

The Black Sea Synergy and the EU- Black Sea Ministerial Dialogue

Biodiversity and environmental protection must continue to feature as one of the BSS' priorities.

- Cooperation between Black Sea countries and the EU should focus in particular on monitoring and reducing the environmental impact of large infrastructure developments, including oil, gas, and transport infrastructure, in the spirit of the Espoo Convention[9] and of its protocol on strategic environmental impact assessment. As many of these projects are promoted by the EU or its member states, the EU should view it as its responsibility to prevent damage to habitats;

- The European Union and the European integration process as such are usually seen as attractive values in their own right in the Black Sea Region. The EU should ensure that its own approach to nature protection is perceived as a central element of its values, successes and strengths;

- The promotion of environmental protection and conservation policies on the basis of EU legislation should constitute an integral part of the BSS process. Cooperation with non-EU member countries should address conservation priorities and their achievements should be monitored;

9 The ESPOO Convention on Environmental Impact Assessment in a Transboundary context was signed in Espoo in 1991. The SEA Protocol (2003) will augment the Espoo Convention by ensuring that individual Parties integrate environmental assessment into their plans and programmes at the earliest stages. Find more in http://www.unece.org/env/eia/

- The BSS should support the implementation of networks of protected areas such as the Emerald Network, "support monitoring of their progress in the region and ensure that any infrastructure projects envisaged are compatible with their viability.

International cooperation

- There is no formally established environmental cooperation between Russia, Armenia, Georgia, Azerbaijan and Turkey, in spite of the region's exceptional biodiversity value and of the severe threat it is under. An international framework of cooperation for nature protection and are responsible to ensure that adequate funding is available for conservation in the Caucasus should therefore be promoted and supported by the region's countries and the European Union. At present only semi-official exchanges exist between Turkey and Georgia and between Georgia, Armenia and Azerbaijan in the context of the implementation of the Caucasus Ecoregional Plan (WWF, 2006).

Awareness-raising

The protection of biodiversity in the region will depend on policies, administrative capacity, scientific capacity and on the awareness, both among the population and among decisions-makers, of the cost of environmental degradation and biodiversity loss.

- In this respect, a greater emphasis should be placed on the practical consequences of environmental degradation and on the benefits of conservation, particularly in the countryside. Environmental advocacy should be founded on local concerns and values;

- Non-governmental organizations and the media have an essential role in building public support for environmental protection and they have contributed much over the last decade in this respect. Their efforts must be supported;

- In order to promote their independence and to strengthen their message, non-governmental organizations should be assisted in finding ways to develop their own funding sources locally, whether from the general public, from public institutions or from the private sector. International support programmes in this sector should aim primarily for the long-term development of civil society organizations.

Access to resources

- National governments should be encouraged to allocate appropriate resources to nature protection; international funding for biodiversity projects is to be encouraged, in particular through EC programmes (Regional funds, LIFE plus, ENPI, IPA);

- Authorities responsible for nature protection should explore, with international support, alternative financing systems to supplement public funding when it is deficient;

- A strong scientific research capability is essential to sustain the protection of biodiversity and this should be supported by Black Sea governments and by the EU.

Governance and enforcement

- The EU should scrutinize the enforcement of conservation legislation in the region, and react to significant infringements. It should in particular include this issue in its progress reports on the implementation of ENP action plans (see Appendix B for a detailed description of the European Neighbourhood Policy) and in the enlargement progress reports for the case of Turkey;

- Non-governmental organizations should be provided with assistance, support, and training in the methodological, legal and other tools available to tackle cases of corruption affecting the natural heritage;

- Governments, with international support where required, should place a greater emphasis on mainstreaming conservation into development policy;

- Donors and international financial institutions should provide support towards the implementation and enforcement of nature protection legislation and policy.

Chapter 2 / ENERGY AND CLIMATE CHANGE IN THE BLACK SEA REGION

2.1 / Energy and climate change in the Black Sea Region: setting the context

The Black Sea Region[1] comprises a diverse set of countries – including former Soviet Republics, an 'old' EU member state, new EU member states, an aspirant to that status, and of course Russia itself. The diversity has a unifying feature other than some proximity to the Black Sea: hydrocarbons. Both extraction, as in Azerbaijan and Russia, and transmission – whether over land or water – give each country strategic importance, even those completely deprived of oil or gas. Other energy and climate change issues are important in the region, but it is oil and gas that drives everything.

The region has been the focus of a rivalry for energy resources since the mid-19th century, when Baku became the hub of the Caucasian oil industry. International interests like the British, Americans, Russians, Turks and Iranians have buffeted a region also facing ethnic and border conflicts (Chechens, Ingush, North Ossetians, Armenians, Azeris, etc.), with energy exacerbating and amplifying the importance of the problems (Tonchev, 1997).

Access to oil and gas in Europe is important to its economy, and oil and gas income is important to those countries extracting and transporting it. However, oil and gas– ensuring access to it, and making money from it – tends to obscure many other energy-related issues in the region, including aspects of both alternatives to oil and gas within the region itself, and the knock-on impact of securing long-term oil and gas supplies in the EU.

Energy security in the EU is taken to be nearly synonymous with supply from as many sources as possible, and with volumes guaranteed into the future. As a result, EU energy cooperation with other countries focuses on diversifying energy sources, their country of origin, as well as country of transit.[2] But ensuring diversity means consistently planning for new capacity, which costs economic, political and environmental capital to achieve. The result is that renewable energy, energy efficiency and other laudable aims, despite being addressed by ENP Action Plans and the Baku Process, still play a negligible role in the region.

While oil and gas is the central fact of the energy politics of the region, there is also a legacy of nuclear energy and associated pollution to contend with. Several Soviet-era power plants that do not conform to western safety standards pose an ongoing threat – Ukraine's Chernobyl catalyzed world anti-nuclear opinion two decades ago, but among other examples of concern, Armenia operates an outdated and previously damaged facility in a seismic zone and Russia has extended the lifetime of several old reactors.

Climate change plays into the dynamics of the region in three ways: first is how climate change will impact the region, second is how the region's oil and gas itself lends to climate change internally and externally, and third is the generally inefficient production and use of energy,[3] leading to higher emissions than necessary given the many potential improvements, which we will review.

This chapter contends with a given: oil and gas will likely remain of pre-eminent importance in the region's politics and economics. The question is if it is possible to strike a better balance, where the focus on oil and gas does not derail options elsewhere. We will examine the policies and programs underway (in the region itself and within the EU), and how they might best be harnessed, and how new funds and initiatives might be brought to bear on greening energy supply and demand in the region.

2.2 / Impacts of energy use on the environment

Environmental impacts from energy are very much in evidence in the Black Sea Region, given the confluence of several factors – first and foremost is the exploitation of oil and gas in the Caspian region, and its transport through other countries to the market. Creating impacts through leakage, waste production and emissions by processing facilities, the oil and gas industry leaves a very heavy footprint on the area. The second factor is that the region is dominated by former Soviet countries characterized by a legacy of polluting and inefficient industry, and inefficient use of energy in all sectors; third is the legacy and ongoing use of nuclear energy, which has been of extreme importance in some countries, not least Ukraine, which was home to the Chernobyl disaster.

Aside from Russia, the main oil and gas producer in the region is Azerbaijan. It has both onshore and offshore production, in the Caspian Sea. Oil industry installations are major sources of solid, liquid and gaseous waste to air,

1 Taking the definition to be that of the Commission's 'Black Sea SYNERGY': Azerbaijan, Armenia, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Turkey and Ukraine.
2 The Communication to the European Council "External energy relations – from principles to action", Brussels, 12.10.2006, COM(2006) 590 final, lists as one of the top priorities of the EU energy policy to ensure the diversification of routes and sources of external energy supplies.
3 One of the reasons for this inefficiency is that former Soviet republics are used to receiving energy subsidies and currently domestic prices in the region hardly ever reflect the full, long-term costs of energy.

ground and water. They are sources of sulphur dioxides, carbon monoxide, nitrous oxides, volatile organic compounds and others.[4]

Azerbaijan's oil facilities contribute significant amounts of pollution.[5] Oil pollution levels in the Caspian Sea itself are up to almost 12 times the maximum allowable level, while heavy metals are also at multiples of their permissible levels. Toxics in the food chain are already showing their impacts on, amongst others, fish population.[6] As the industry gained momentum in the 90s following years of decline under the Soviets, the proportion of Azerbaijan's air pollution from oil facilities, already at around 50%, rose to over 70%.[7]

The environmental impact of oil operations is not unique to the region, but it is exacerbated by several factors – the age of some operations, as the area first started exploiting oil and gas in the 19th century, and the rapid expansion of production during the post-Soviet rush to exploit resources in the 1990s.

Environmental impacts are not limited to production sites. Impacts caused by the transport of oil are a long-standing concern in the region, and are nowhere more in evidence than in the Black Sea itself. The Black Sea is one of the most polluted, anoxic and eutrophicated seas in the world, and is often called "a disaster area", but it has shown signs of improvement since 1995 (Oral, 2007). Although agriculture and other diffuse sources are suspected of delivering the most pollution into the sea and into the Danube, shipping and the shipping of oil and gas are also important contributors.

Often overlooked, the oil released from accidents of any type of ship can create major environmental damage. But it is the risk of oil tanker accidents that is of particular concern. The narrow and winding Turkish Straits represent a major shipping hazard – there have been some 500 accidents there since 1946, two of which involved oil tankers – the *Independenta* and the *Nassia*. Oil transport has been increasing through the straits over the last decade, up from 68 mta to 146 mta from 1996 to 2004 (Oral, 2007); current shipping traffic in the Bosphorus and Dardanelles is about 45 000 vessels per year (one every 12 minutes), including some 6 000 tankers every year (EEA, 2007). Aside from their importance to shipping, the Turkish straits are ecologically important as a corridor for fish and mammal migration from the Mediterranean to the Black Sea, and environmental contamination can be especially damaging there.

Aside from the Straits, the Black Sea has not had as many incidents with oil tankers, though many other types of ships have been lost at sea during storms. However, the potential for disaster has always existed given the large volume of transport – a potential that was unfortunately realized on November 11, 2007. A violent storm sank several ships, killing many sailors and releasing several thousand tonnes of oil from a tanker. However, the accident was not only an 'act of God' – the tankers, were ill-equipped for a sea voyage, much less in heavy weather.. According to environmentalist observers, the rush to profit from high oil prices has come at the expense of safeguards in Russia, of which this was just an example (Weir, 2007). According to some estimations it will take the affected areas of the Black Sea Region's delicate marine environment five to ten years to recover from the oil spill that resulted from that accident.[8]

Given the hazards of oil shipping and the already precarious state of the environment of the Black Sea, oil and gas pipelines are increasingly under consideration. New energy infrastructure currently considered in the area includes the following projects:

- the reversal of the Odessa-Brody pipeline and its extension to Poland to the West and by sea and pipeline through to Kazakhstan to the East;
- the Constanta-Triest,[9] Burgas-Vlore and Burgas-Alexandroupolis oil pipelines, for which an implementation agreement was signed in February 2006;
- the Nabucco pipeline project, which would transport gas from the Caspian Sea through Turkey, Bulgaria and Romania, to reach Austria and possibly other EU countries. The construction of this €5 billion project is supposed to start in 2009 and finish in 2012. Negotiations concerning the Nabucco project between the natural gas companies of five countries - Bulgaria's Bulgargas, Romania's Transgas, Turkey's Botas, Hungary's MOL, and Austria's OMV – were concluded in June 2006 and the Nabucco Company Pipeline Study Group was formed to undertake the construction of the natural gas pipeline network. RWE joined the Nabucco consortium in 2008. In addition, the EU has also been interested in building a Trans-caspian pipeline, which could fill Nabucco with Turkmen gas. Recent developments, however, have fuelled doubts over whether Nabucco is viable, as Moscow has proposed alternative pipelines on similar routes Recent developments, however, have fuelled doubts over whether the project will be built, as Moscow has proposed alternative pipelines on similar routes.[10]

4 'Environmental Movement in Azerbaijan, RUZGAR' on http://azenviron.aznet.org/

5 Azerbaijan's oil facilities have been characterized by one regional expert as 'the worst in the world' in terms of their environmental characteristics: Alexander's gas and oil connections, 'Caspian Sea in danger of turning into environmental dead zone' http://www.gasandoil.com/goc/news/ntc42931.htm, 28-06-04

6 Alexander's gas and oil connections, ibid.

7 RUZGAR, op cit.

8 Arnold, C., 2007, "Russia: Oil Spill Highlights Tragic Environmental Legacy", Radio Free Europe Radio Liberty, 28 November 2007, http://www.rferl.org/featuresarticle/2007/11/4e76545d-27ab-41cd-b1b1-9d415bd1c9a0.html

9 On 3 April 2007 the Commission gave its support to this Pan-European Oil Pipeline which will link the Black Sea directly into the continental EU pipeline system. The project would reduce the chances of a serious accident in the Bosphorus Straits, the Black, Aegean and Adriatic Seas by avoiding further oil tanker traffic (Press Release IP/07/464, European Commission, 3.04.2007). See also http://crib.mae.ro/index.php?lang=en&id=31&s=5851&archiva=true

10 These include plans to extend the Blue Stream gas pipeline (which currently runs from Russia to Turkey) through the Balkans. In March 2007 Hungary's prime minister showed interest in this alternative Russian-controlled project, called Blue Stream II. In November 2007, Gazprom and the Italian firm ENI signed an agreement to build this «South Stream» gas pipeline, with branches to Austria and Italy (Woehrel, 2007). In addition, in May 2007 Russia celebrated a preliminary deal with Kazakh and Turkmen to build a new pipeline from Turkmenistan into Russia, which would also undermine Nabucco's commercial viability (Barysch, K., 2007).

- on the one hand there is already the established Blue Stream pipeline that connects Russia with Turkey. On the other, Russia is planning to construct a South Stream pipeline that would run from Russia to Bulgaria and through the Balkans. In November 2007, Gazprom and the Italian firm ENI signed an agreement to build this South Stream gas pipeline.

Nevertheless, pipelines consume land, create visual impacts, can disrupt habitats and are potential sources of leakage. Indeed, older pipelines are major sources of pollution – in Russia alone there are thought to be 22 000 pipeline bursts a year, of which 10 are serious, such as the 3-tonne spillage from the Europe-bound Druzhba pipeline (Weir, 2007).

In addition, pipelines are attractive targets for terrorist attack. For instance, Turkey has faced several actual or attempted terrorist attacks on oil and gas pipelines (MIPT 2007).[11]

However, new pipelines are acknowledged to be much more reliable, and given the recent experience in the Black Sea, the logic of preferring pipelines over ships seems fairly clear from an environmental perspective. The European Union has integrated this into its call for more pipeline transport, stating "it is of utmost importance to give a higher priority to... the alternative of transporting oil by pipelines. This is considerably safer and more environmentally friendly" (inogate, quoted in Oral, 2007).

For instance, on 3 April 2007 the Commission gave its support to the Constanta-Trieste oil pipeline, which will link the Black Sea directly into the continental EU pipeline system. The project would reduce the chances of a serious accident in the Bosphorus Straits, the Black, Aegean and Adriatic Seas by avoiding further oil tanker traffic (Press Release IP/07/464, European Commission, 3.04.2007). A list of Bosphorus Bypass Oil Pipelines is provided below:

In addition, the Baku-Tbilisi-Ceyhan pipeline can also be seen as an example of an effort that will relieve some pressure (or at least the growth of pressure) from shipping, and BP has taken pains to promote its environmental credentials and has spent €30 million working with affected communities. Nevertheless, serious criticism has been leveled at the project on several fronts, casting doubt on the rationale of pipelines. While BP extols the safety of its technology, it is a new application and causes some concern about future corrosion. The pipeline runs through both pristine wilderness and seismic areas, and has more than enough capacity for the likely supply from Azerbaijan, leading to speculation that it will enable further exploitation of Caspian oil fields in Kazakhstan, essentially shifting environmental problems upstream (Radio Free Europe, 2006).

Table 1: Bosphorus Bypass Oil Pipelines (U.S. DOE, 2007)

BOSPHORUS BYPASS ROUTES- Key Information						
Project Name	Lenghth (miles)	Cost estimate	Investors/ Countries	Added Capacity (b/d)	Current Capacity (b/d)	Project Status
Bourgas Alexandropoulis	174	$800 million	Gazprom, Lukoil, Rosneft, TNK-BP interested, RF,Bulgaria, Greece	300,000-700,000	0	April 2005-MOU: First oil planned 2008. Initial capacity 300.000 bbl/d. Linked to CPC expansion
Bourgas- Vlore (AMBO)	565	$1.2 billion	Albania, Macedonia, Bulgaria	750,000	0	Environnemental study begins in 7/05, finalization of consortium in 2005. First oil 2008, some construction begun but still speculative.
Constanta- Trieste, SEEL (Romanian coast to Italy)	843	$1 billion	GE, CNOOC, EBRD, IFC, Italy, Romania, Serbia, Slovenia, Croatia	480,000- 2 million		Construction expected to begin during 2007. Connection to Adria pipeline.
Samsun Ceyhan	350	$1 billion initially	Turskish Gov't	1,000,000		Financing unknown. BOT AS finished feasibility study in 2007. Completion supposedly 2009.
Trans- Thrace projects (Kiyikoy- Saroz, Igneada- Saroz)	120	$400-900 million	Transneft (Kiyikoy), U.S.- Turkey- Kazakh (Igneada)			Opposed by environnemental groups due to delicate ecosystem of Saroz bay.
Odessa- Brody (Reversal)	414	Ukraine would have to return $108 million to TNK-BP			200,000	Ukraine gov't wants by end of 05.
Brody- Gdansk (Poland) Extension	304	$500-600 million	Ukraine, Poland, possibly Czech, Kazakh	0	Currently running - Brody to Odessa	EU feasibility study began 6/05- Kazakhstan and Poland signed MOU to invest 7/05.

11 MIPT, 2007: MIPT Terrorism Knowledge Base. Turkey. Available at: http://www.tkb.org/IncidentRegionModule.jsp?startDate=01%2F01%2F2000&endDate=12%2F17%2F2007&domInt=0&suiInt=0&filter=4&detail=21&info=Turkey&info1=1&imageField.x=78&imageField.y=6&imageField=filter+results&pagemode=incident&regionid=1&countryid=TU&sortby= [17 December 2007)

Uranium prospecting and exploration

Some of the most contaminating industries are uranium mining and milling. These activities already impact the region and are expected to increase in the near future, as additional mining projects are initiated.

Ukraine's annual uranium production, for instance, accounted for 800 metric tonnes in 2006, according to WNA (2007) estimations[12] and the country has announced plans to double its production by 2010, with a five-fold increase envisaged by 2020. The target is to reach an output level of 5 900 tonnes of uranium per year in 2014-2025, and 6 400 per year in 2025-2030.[13] According to WNA (2007), Romania's annual production accounted for 90 metric tonnes in 2006.

In Bulgaria, uranium production ceased in 1992.[14] However, the country has considered re-opening its uranium mines under the recommendation of a report of the Bulgarian-Russian intergovernmental commission for economic cooperation. Indeed, both Russia and the Canadian company Cameco showed interest in mining uranium there. In particular, Russia's newly-formed Uranium Mining Company is considering investing in Bulgaria, as this would reduce the cost of the nuclear fuel it provides for the Kozlodui nuclear plant. Russia's investment decision was also supported by the fact that its nuclear services exporter has recently won a tender to build a power plant outside Sofia.[15]

Finally, in Armenia, the US-based Global Gold Corporation has proposed uranium mining at Nor Getik.

Nuclear Energy

The Chernobyl disaster and its legacy are well-known, but in the Black Sea Region Armenia provides perhaps the most interesting case study of the interaction between nuclear, fossil and (potentially) renewable energies. In 1988 its nuclear facility Medzamor, which supplied 40% of the country's electricity, was shut down following a serious earthquake. During that time the country received oil and electricity mainly via Azerbaijan, which shut off supplies due to the Karabakh conflict, leading to severe energy shortages. The reopening of one of the two nuclear units at Medzamor in 1993 has been the focus of considerable international attention and investment (by the EU, the US, Russia, the IAEA and others) due to concerns about the safety of the facility and its location in a seismic area (INSC, 2006). The EU has been pressing for the unit's closure, as has Turkey, but the country has been reluctant to do it without alternatives in place. The EU has suggested the development of hydropower facilities, including rehabilitation of the Tatev Hydropower Plant, as well as other options (EuropeAid, 2006).

The difference between leverage on EU members and non-EU neighbours is quite in evidence in the nuclear field. While Armenia still operates Medzamor, Bulgaria shut down four reactors at Kozloduy (Kozloduy 1 & 2 were closed at the end of 2002 and Kozloduy 3 & 4 at the end of 2006) with the prospect of $200 million from the EU to build two new ones, under the terms of its accession to the EU (WNA, 2007).
Of the Soviet reactor types that do not meet Western safety standards (VVER-440/V-230s and RBMKs), only Armenia's unit, and eight units in Russia remain – of these several have had upgrades and lifetime extensions (WNA, 2007).

Table 2: Nuclear power plants in the region (IAEA, 2006)

Country	Operational	Under Construction	Shut Down	Suspended	Cancelled
Armenia	1		1		
Bulgaria	4	2	2		
Romania	1	1		3	
Russia	31	4	5	5	8
Ukraine	15	2	4	1	3

12 See http://www.wise-uranium.org/umaps.html?set=annu
13 See WISE (World Information Service on Energy) Uranium Project, "New Uranium Mining Projects – Europe", http://www.wise-uranium.org/upeur.html
14 Bulgaria's uranium deposit accounts for nearly 12,000 tonnes, according to the Bulgarian National Radio (see also http://www.wise-uranium.org/index.html).
15 See Sofia Echo, 26 May 2006 and 12 September 2006, and http://www.wise-uranium.org/upeur.html) and factsheet on Bulgaria for additional information

2.3 / Climate Change Impacts in the Region

In anticipating the impact of climate change on the Black Sea Region, it may be interesting to note that the region has already experienced one of history's most striking examples of climate change impact. Some 5 200 years ago, a period of natural global warming raised sea levels to the point that the Mediterranean breached the Bosphorus, creating a massive influx of water into the much lower-lying Black Sea. It flooded an immense area, driving populations (and with them their knowledge of agriculture) West and East into Europe and Asia. This event is believed by some to be the origin of the story of the Biblical flood in the book of Genesis (Linden, 2006).

Such dramatic change may never return, but according to the most recent scientific assessments the region does show certain vulnerabilities. Climate change may affect storminess, sea level rise, water availability, droughts, and flooding:[16]

Storms: Moving eastward across the Mediterranean, storminess is anticipated to drop due to climate change, with the exception of certain areas, which includes parts of the Black Sea.

Sea level rise: Danger from sea level rise along the Black Sea is among the highest in Europe due to the nature of the coastline – low and subsiding in many places. There could be significant increases in damage because of the storm surges and tsunamis acting on a higher sea level. While parts of northwestern Europe have created shoreline management plans, this is less in evidence in southern and eastern Europe. Such plans link defense, accommodation and retreat strategies into a comprehensive adaptation strategy.

Water Stress: Water challenges resulting from climate change will mean flooding in some places of Europe, but drought is more likely a consequence for Southeastern Europe. By the 2050s, annual runoff may reduce by 20 to 30%, and by the 2070s, 100 year droughts may occur every 50 years or less. Water shortage forces hard decisions, often requiring large investment.

In addition, based on the work of the German Advisory Council on Global Change (WBGU), the Black Sea is likely to experience (i) a degradation of freshwater resources; (ii) an increase of storm and flood disasters; (iii) a decline in food production; and (iv) environmentally-induced migration.

Climate impacts vary not only by region, but also according to terrain and ecosystem type. The countries around the Black Sea encompass a diverse range of types as categorized in the figure below – mountains to the East, 'Mediterranean' to the South and Southwest, Steppe to the North and the broad expanse of central European agricultural and forest land to the West. Each is subject to different climate impacts (Figure 1).

While greenhouse gas emissions, largely from energy use, are impacting the climate, the climate will in turn affect energy use, often driving a further rise in emissions.

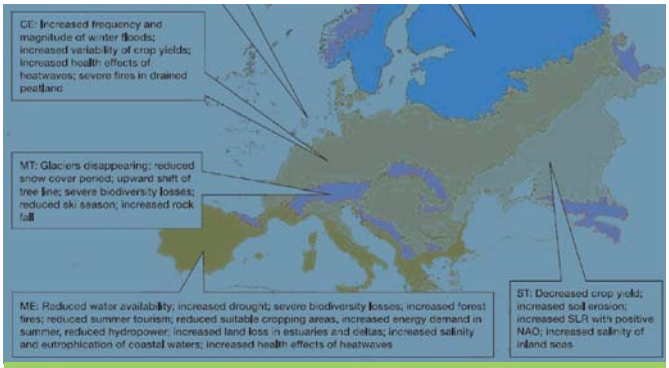

Figure 1:
Likely climate impacts in Europe by type of terrain - there is much diversity around the Black Sea (extract from IPCC, 2007, figure 12.3, page 558)

Heating and cooling needs will be impacted by climate change, with strong regional variations due to the prevailing climatic conditions – in the North, reduction in heating needs will be significant. However, in the Black Sea Region it is most likely that there will be increases in cooling demands, putting a further strain on energy systems.

Water scarcity can also impact power production negatively. Under moderate climate change scenarios, there could be a 25% reduction in availability of hydropower in Southeastern Europe (Lehner, et al., 2003). Similarly, both a lack of water and the rising temperature can impact its availability as a coolant in thermal and nuclear power plants, leading to reduced capacity. Other potential impacts include increased energy requirements for pumps and water management infrastructure, as well as the significant energy requirements for desalination, if that option is chosen to meet freshwater demands in areas of acute scarcity.

Adapting to climate change and avoiding the worst of the impacts will be as much a result of successful management and administration as of appropriate choice of technologies, policies[17] and techniques. Management of watercourses affecting different uses and regions, and integrating planning for different types of land-use are two examples. Where there is any political or administrative discord, as in some areas around the Black Sea, climate impacts may be enhanced.

16 Reference for this chapter is the 2007 Intergovernmental Panel on Climate Change, Fourth Assessment Report, Working Group II Report on climate change Impacts, Chapter 12, Europe.
17 These include appropriate and sustainable use of European Community external assistance, for instance under the ENPI or IPA.

2.4 / The Energy characteristics of the countries in the Region and their renewable energy options

Each country in the Black Sea Region is distinct in terms of its energy use and potential for renewable energy, but several trends are clear. First is that renewables are clearly underexploited. While this is true in Western Europe as well, the gap between use and potential is larger in the East (Ragwitz, et al., 2005). Second is that of the renewables sources, hydropower is the best known, but at large scale (and hence questionably 'renewable'); the massive growth in wind power seen globally is beginning to make itself known in the region.

Finally, the patterns of Soviet and post-Soviet energy relations are clearly influential – for example, the legacy of nuclear energy defines the starting point for many of these countries, as even when old capacity is retired, there is a tendency toward replacing it with nuclear. The abundance of oil and gas in the Caspian region has left countries there using that resource for domestic use, as in Azerbaijan, while many other countries continue to rely heavily on fossil fuels that have historically been available at cheaper than market prices, complicating the economic argument for alternatives.

As an appendix to this report are a series of fact sheets which detail the energy characteristics of the countries in the Black Sea Region, and a discussion of the renewable energy used and the future potentials (see Appendix C). The following table presents an overall characterization of the fact sheet contents:

Table 3: Energy characteristics and renewable energy potential of the countries in the Black Sea Region

Country	Oil Production	Gas Production	Electricity Sector	RES Potential
Armenia	No domestic production - Imports from Russia and Azerbaijan	No domestic production - Imports primarily from Russia via Georgia and, starting from 2008, through Iranian-Armenian gas pipeline	- 30% supplied by 1 nuclear plant built in the '80s with a design life of 30 years - low efficient thermal plants operating beyond planned lifetime - about 25% from hydropower	- good potential for wind energy development (3MW installed in 2005) - despite favorable climatic conditions, solar energy potential is little explored - funding for exploring biogas opportunities lacking - geothermal energy not promoted in any way - not explored economically feasible potential of hydropower estimated between 1.8 and 2.0 kWh in 2005.
	Russian control over various energy assets			
Azerbaijan	Significant - 860,000 bbl/d in 2007 (EIA) - Most of it exported via pipelines - BTC and Baku-Novorossiysk	Significant - 241 Bcf in 2006 (EIA)	- 80% supplied by thermal plants	- no installed wind energy capacity, except for small units used for irrigation and lightening - several sources of residues for biomass combustion not explored - solar energy potential not explored - high potential for geothermal development - potential hydro resources relatively limited but by concentration of hydro resources on the territory the potential is significant
Bulgaria	Negligible	Negligible - Imports primarily from Russia	- 9,4 % supplied by RES (year 2006). Capacity expected to increase by 2009 - 40% supplied by nuclear facility in 2004 ($688M from the EU as a compensation for closure of 2 reactors) - construction of 2nd nuclear plant announced in 2005 to become operational by 2013 - electricity from RES increased from 7,2% to 9,8% between 1997 and 2004 - country's target: consumption of electricity from RES equivalent to 11% of total electric energy consumption in 2010	- technical and economic potential of hydropower already exploited (including mini-hydro) - good opportunities for biomass - growth rate of 17% between 1997-2004 for biomass heat - wind energy capacity estimated at 2.200-3.400MWe. Accounted for 2GWh in 2004 - Bulgaria's National Programme on RES (NPRES, 2004-2010) - Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) supported by EBRD, the Bulgarian Government and the EU since 2004
	Important transit country for oil and gas			
Georgia	Environmental and security concerns have influenced pipeline projects. Georgia is also a key transit country.		- 80% supplied by hydropower - thermal power plants estimated to provide 29.15% in 2007	- Annual solar energy potential estimated at 108MW. Low use in the past. Solar heating has increased recently - Deregulation process has allowed third parties access to small hydro power to increase share - Good wind energy resource potential but no operative capacity, except for small unities of about 6KW each - Zugdidi-Tsaishi geothermal area considered exploitable

Table 3: Energy characteristics and renewable energy potential of the countries in the Black Sea Region

Country	Oil Production	Gas Production	Electricity Sector	RES Potential
Greece	Small - Imports primarily from Iran, Saudi Arabia, Russia, Libya and Egypt	Negligible - Imports mainly from Russia - Pipelines projects envisaged to decrease dependency	- 75% supplied by thermal in 2004 (mostly lignite-fired and some oil-fired) - 21% supplied by hydropower - demand has growth of 50% over last decade - growing demand expected to be met by natural gas-fired plants	- increase in wind power capacity of 61% between 1997-2004 (currently 475MW installed) - wind farms could meet 15% of country's electricity demand (CRES) - 1/3 of Greece's energy demand could be met by solar power (EU, 2007). There was a 27% increase between 1997 and 2004 - country's target of 20.1% of gross electricity consumption from RES by 2010
Moldova	Negligible	No domestic production - dependent on Russia	- domestic thermal power plants (unprofitable, large debits) - regional imports from Ukraine (30%) and the Transdnistria region of the Republic of Moldova (30%)	- good potential for wind power development (potential capacity around 1000 MW, but no turbines operate so far, 2007) - no significant application for solar energy - biomass potential held back by inefficiency of domestic stoves and high investment costs - potential for hydroelectric relatively low. Greater potential in small hydro
	Important transit country			
Romania	Significant - but net oil importer primarily from Russia	Significant (decreasing trend of production) - net gas importer from Russia	- coal as most important fuel - biomass + hydropower account for 29% of electricity generation - one nuclear plant with 1 working reactor producing 10% of country's consumption in 2004 - 2nd reactor under construction and expansion planned to allows export	- share of RES in energy supply is above EU average - 2/3 of renewable energy production comes from biomass and most of the reminder from hydropower - large potential of hydropower but average growth is rather small (5% increase between 1997-2004) - wind farm accounted for 2GWh in 2004. Government aims at increasing wind share
	Several pipeline projects planned			
Turkey	Small - net oil importer, primarily from Russia, Iran and Iraq	Negligible - risk of oversupply if it cannot use or re-export all the natural gas it has committed to import	- Renewable Energy Law adopted in 2005 to promote electricity from RES (includes feed-in tariffs and purchase obligations) - nuclear energy to be included into energy mix (nuclear reactors expected to be operational in 2012-2020, depending on financial)	- vast RES unused potential - RES ambitious objectives lacking - energy from hydropower can be further developed
	Important transit country for oil and gas. Infrastructure projects have been carried out during last decades to position itself as an energy hub			
Ukraine		Domestic production meets 25% of total demand - relies on imports from Russia - focuses on reducing imports due to existing tension with Russia	- 50% supplied by nuclear (government intends to increase nuclear's share in the mix)	- Hydropower has 20 billion kWh/year potential but accounted for 4.4 million kWh in 2005, less than 0.5% of total primary energy demand. - growing share of RES comes from large hydro - National wind programme includes subsidies and preferential tariffs. Installed capacity is 86MW but EBRD estimates that wind power could supply 20-30% of total demand for electricity - use of biomass for heat is relatively common in rural areas. Agriculture sector could supply a significant amount of biomass and biofuels could become a valuable export commodity - Southern and southeast regions of Ukraine have largest potential for solar energy (e.g. Crimea was the all-USSR test ground for solar energy), but current use is minimal - Geothermal resources are significant and State programme intends to increase installed capacity of heat supply systems from 13MWt in 2005 to 250MWt by 2010
	Largest gas transit country by volume and hosts major oil transit routes (84% of Russian gas supplies to Europe passes through Ukraine via pipelines)			

Table 4: climate and energy characteristics in the region (Germany and UK for comparison) (EEA, 2007).

	Total GHG per capita	% change in GHG	% change energy industry GHG	% change industry processes	Energy consumption per capita	Energy consumption per GDP (toe/$m)	Renewable energy share
Armenia	1.71	0.97	-52.19	-	0.7	123	8
Azerbaijan	4.65	16.17	-9.84	159.81	1.6	22	2
Bulgaria	8.70	5.07	7.93	2.48	2.4	222	5
Georgia	1.89	25.52	-13.95	-	0.6	154	42
Greece	12.40	4.46	4.59	2.47	2.7	109	5
Moldova	3.46	8.55	-6.85	0	0.8	381	2
Romania	7.13	17.28	4.97	12.95	1.8	198	12
Russia	14.40	4.14	3.69	15.54	4.5	364	4
Turkey	4.10	5.34	-0.81	11.63	1.1	122	13
Ukraine	8.70	4.64	2.39	10.41	3.0	381	1
Germany	12.31	-0.74	4.70	6.19	4.2	131	4
UK	11.01	-0.63	8.35	-12.97	3.9	123	2

2.5 / EU Policy and Other Players

EU Policy

Appendix A describes the many programmes and initiatives the EU is engaged in as leader or partner in the Black Sea Region. However, there are three overarching policies of relevance:[18]

1) The enlargement process towards South-Eastern Europe and Turkey;[19]
2) The "Partnership and Cooperation Agreement (PCA)" with Russia;
3) The European Neighbourhood Policy (ENP – See Appendix B), with Ukraine, Moldova, and the three South Caucasus countries also being active in Black Sea cooperation.

Enlargement process

A perspective of EU membership is a powerful lever, capable of inducing the legal, institutional and economic reforms needed in the Black Sea Region. A key element of the enlargement process is that countries have to fully transpose and implement EU legislation by the time of accession, which means, for instance, adopting environmental standards and policies that can be (but are not always) stricter, implementing energy reforms, adopting the EU energy *acquis*,[20] and joining the Energy Community Treaty.[21]

For instance, Turkey has already taken major steps in aligning its legal framework with the EU energy *acquis*. The EU has a strong interest in supporting this process, which includes technical interconnectivity of the Turkish grid with the EU's grid, and the full liberalization of Turkey's rapidly growing energy market. The ongoing access negotiations play a central role in this context.

In addition, the EU provides financial and technical assistance to candidate and potential candidate countries. The Instrument for Pre-Accession Assistance (IPA) has replaced the 2000-2006 pre-accession instruments[22] and concentrates on institutional building, enhancing administrative and judicial capacity and encouraging some alignment with the *acquis communautaire*.

In the framework of its pre-accession assistance for Turkey, the European Commission also provides direct support to the country's energy sector, in particular in the areas of legislative alignment and institutional building. Furthermore, a fund for infrastructure - related projects (FEMIP – Facility for Euro-Mediterranean Investment and Partnership) was approved by the Commission in 2005. This fund can be used as a tool to support large scale EIB interventions in the energy area in Turkey.[23]

Besides, the European Commission decided to establish, together with the Council of Europe Development Bank and in cooperation with the Kreditanstalt für Wiederaufbau

18 See Marius Vahl, "The EU and Black Sea Regional Cooperation: Some Challenges for BSEC", CEPS Commentary, 15 April 2005.
19 After the enlargement of the EU with ten new Member States in 2004 and with Romania and Bulgaria on 1 January 2007, the enlargement process currently focus on Turkey, Croatia and the former Yugoslav Republic of Macedonia. Turkey in particular has been granted a membership as early as 1963 and accession negotiations were launched in October 2005.
20 See the European Council Conclusions of 9 March 2007 based on the European Commission's Communication "An Energy Policy for Europe".
21 The Energy Community Treaty entered into force on 1 July 2006 and provides a structured regulatory framework with shared trade, transmission and environmental rules. Turkey is an observer to the Treaty.
22 Ongoing projects from the old instruments include a multi-country programme on environment and enlargement, implemented by DG Environment, which covers Romania, Bulgaria, Croatia and Turkey. This programme is designed to strengthen of the countries to ensure full compliance with the EU environmental acquis as well as developing capacity of the environmental authorities for implementation and enforcement; this programme will also help to reinforce the ability of other stakeholders to play their full role (see http://ec.europa.eu/environment/enlarg/enlargement_en.htm).
23 See "EU Energy Policy and Turkey" http://ec.europa.eu/enlargement/pdf/european_energy_policy/fact_sheet_ecd_brux_comments_25_may_en.pdf

and the European Investment Bank, two multi-beneficiary programmes to increase investment in energy efficiency ("Energy Efficiency Finance Facility"). Eligible countries benefiting from these programmes include Bulgaria, Romania and Turkey.

As it is clear that accession is a process likely to slow down (or even halt), it is not sure whether the perspective of EU membership to improve environmental performance will continue to be an available tool. Indeed, it is the interest in finding effective alternatives to accession that explains the emphasis being put on the ENP and other strategies.

Strategic partnership with Russia

The EU/Russia strategic partnership goes far beyond the scale of the ENP, which is only one pillar of the EU-Russia relationship (hence Russia's separate status as a "strategic partner" in the ENP).

The Partnership and Cooperation Agreement (PCA) with Russia expired in November 2007, but was extended automatically as neither party gave notice to the contrary. Negotiations for a post-PCA agreement have still not taken place as some EU member states have not provided the EU with a mandate yet (Barysch, K., 2007).

European Neighbourhood Policy (ENP)

The most important of the major policy initiatives relevant to non-EU countries is the ENP,[24] and its implementing programme. Details about the ENP and the ENPI are provided in appendix B.

The ENP covers all neighbours, so that the Black Sea is just one region of cooperation. Although a framework that covers many countries, relationships with those countries are arranged bilaterally through action plans, which can vary in content and ambition. The Commission regards the action plan with Ukraine, in particular, as relatively successful and its implementation has resulted in a Memorandum of Understanding (MoU) on energy cooperation. Under this MoU, a joint proposal from the EU, the European Investment Bank and the European Bank for Reconstruction and Development (EBRD) has provided the financing of hydrocarbon, and some renewable infrastructure projects in Ukraine.
Such infrastructure is not a coincidental outcome – indeed, under the ENPI eastern regional Strategy, which partially provides funding for the environment, energy is included under the "Network" priority area, in addition to transportation. This reveals the real emphasis of this initiative, focusing mainly on the region's potential in terms of energy security and supply diversification for Europe.[25]

In order to ensure the diversification of routes and sources of external energy supplies,[26] EU energy cooperation with other countries tends to focus on achieving diversity of type of energy, of country of origin, and of country of transit. In this context, the Commission has stated its belief that "the development of major international pipelines to deliver oil from the Caspian region and Central Asia to the EU is (…) vital".[27] Hence the emphasis on upgrading the existing and constructing new energy infrastructure in the Black Sea Region (COM(2007) 160 final).

Nevertheless, it is important to note that renewable energy and energy efficiency are partially promoted through the ENP.

Some EBRD loans have been granted to boost energy infrastructure in the region and the European Commission has expressed strong support for the realization of several pipeline projects, such as the Baku-Supsa pipeline, the Baku-Tbilisi-Ceyhan oil pipelines, the Baku-Tbilisi-Erzurum gas pipeline, and a new trans-Caspian trans-Black Sea energy corridor which would allow additional gas exports from Central Asia through the Black Sea Region to the EU. In addition, the Commission has acted as a catalyst for an agreement between Greece and Turkey towards the completion of a gas pipeline linking the two countries with a possible extension to Italy.

Not all cooperation is about pipelines though. Electricity infrastructure and related improvements are also a major focus. In November 2006 the 2nd Energy Ministerial Conference was held under the Baku Initiative[28] sponsored by the European Commission, and a new Energy Road Map was agreed which set a long-term plan. The priority areas identified in the Road Map include supporting to sustainable energy development - including energy efficiency, renewable energy sources and demand side management - and attracting investment into energy projects of common interest.

"Twinning" instrument

One of the most powerful tools under the ENPI and the Pre-Accession Instrument (IPA) is "twinning", which allows member states to second technical experts to candidate

24 These include appropriate and sustainable use of European Community external assistance, for instance under the ENPI or IPA.
25 See the Memorandum to the Commission (Annex I), Annual Action Programme covering the Regional Strategy Paper 2007-2013 and Regional Indicative Programme 2007-2013 for the ENPI East for 2007.
26 See the Communication from the Commission to the European Council « External energy relations – from principles to action », Brussels, 12.10.2006, COM(2006) 590 final.
27 Paper from the Commission/SG/HR for the European Council, "An External Policy to Serve Europe's Energy Interests", S160/06.
28 The Baku initiative is a policy dialogue aimed at enhancing energy cooperation between the EU and countries of the Black Sea, the Caspian Basin and their neighbours.

countries and other neighbours concerned to share their experience with the implementation of EU rules for a few years. Such experts, paid for by the Commission, have been working in several countries in the region. For instance, in Turkey, the Italian Regulatory Authority for Electricity and Gas provided support for strengthening the administrative capacity of the Energy Market Regulatory Authority (EMRA) under a twinning project of €1.07 million in 2002. A twinning consortium, comprised of ADEME of France and Senter Novem of the Netherlands, also provided assistance for the improvement of energy efficiency in Turkey in 2003, with a budget of €1.25 million. Ukraine has likewise benefited from "twinning" in various areas. Moldova currently has experts from Britain, Lithuania and Poland working in its government.

The ENPI[29] represents an increase in resources compared to the previous financial instruments. Nevertheless its budget is still relatively modest considering the ambitious reform agenda promoted under the ENP. The Commission has furthermore set aside an amount of €700 million of the ENPI budget for a Neighbourhood Investment Fund to be used to support lending from development-finance institutions[30] in ENP partner countries,[31] particularly to finance crucial infrastructure, including in the energy sector.

There is a general criticism that the incentives offered by the EU are not sufficient to persuade neighbouring countries to carry out many of the political and economic reforms needed. This seems to be true as well in the case of the energy reforms needed, given the existing fossil fuel subsidies and domestic prices applied in the region, which usually do not reflect the price of energy in international markets. As noted above, the success of reforms achieved in preparation for accession will be difficult to reproduce for other non-acceding countries.

Other players: Russian and US policy

The EU is far from being the only external actor with interests in the Black Sea Region. Dominated by former Soviet republics, the area is still firmly in the Russian sphere of influence. The United States, meanwhile, have actively pursued a policy in the region, particularly after the breakup of the Soviet Union.

Russia

Russian companies have put significant effort into purchasing a controlling stake in pipelines, ports, storage facilities, and other key energy assets of the countries in the Black Sea Region. The control of these assets allows Russia to deliver energy supplies to western markets and to secure control over the domestic markets of the countries of the region.[32] Russia has also been raising the price of natural gas charged to the countries in the region, eliminating the energy subsidies that the former Soviet republics were used to receiving.

As noted by Woehrel (2007) it is not clear whether the actions of Russia's energy firms are motivated by the country's foreign policy objectives or exclusively by business considerations. At any rate, many countries in the Black Sea Region fear that Russia may use its energy power to try to interfere in their domestic affairs.

To date Russia has made it clear that it does not intend to ratify the Energy Charter Treaty, which requires implementation of principles of liberal international rules for trade and investment in the oil and gas sector. Instead, as stated by Barysch (2007), Russia has promoted the concept of "reciprocity", as the basis of EU-Russia energy relations.

United States

The United States has strongly criticized Russian efforts to use energy supplies for political purposes.[33] Members of the US Congress have also expressed concern about the impact on European countries of their dependence on Russian energy.

In this regard, the US has supported the building of multiple pipelines from Central Asia and Azerbaijan to Europe, adopting a so-called "pipeline diplomacy".[34] These projects include the Baku-Tbilisi-Ceyhan (BTC) pipeline, and the South Caucasus Gas Pipeline (SCGP). The US also supports the Nabucco pipeline, the Turkey-Greece-Italy (TGI) gas pipeline,[35] the Albanian Macedonian Bulgarian Oil pipeline (AMBO),[36] and the extension of the Odessa-Brody pipeline to Gdansk in northern Poland.[37]

29 European Commission, Proposal for a Regulation of the European Parliament and of the Council Laying down General Provisions Establishing a European Neighbourhood and Partnership Instrument, Brussels 29 September 2004.
30 EIB, EBRD and the bilateral or multilateral development-finance institutions of the member States that have contributed to the Fund.
31 Communication on "Strengthening the European Neighbourhood Policy", Brussels 4.12.2006, COM(2006) 726 final.
32 In several cases where assets were sold to non-Russian firms, Russia cut off energy supplies to the facility. Russia has also planned to build new pipelines to bypass transit areas which it does not control.
33 Secretary of State Condoleezza Rice on January 5 stated that Russia had made "politically motivated efforts to constrain energy supply to Ukraine" (Secretary Condoleezza Rice, Remarks at the State Department Correspondents Association's Breakfast, January 5, 2006).
34 This term is adopted by Woehrel, 2007.
35 The connection between Turkey and Greece was completed in November 2007 while the Greek and Italian gas transportation systems are scheduled to be connected by 2012.
36 AMBO is a Bosphorus bypass project whose construction is expected to start in 2008 and be completed in 2011.
37 In October 2007, representatives of Lithuania, Latvia, Estonia, Poland, Ukraine, Romania, Georgia, and Azerbaijan met with EU and U.S. officials at an Energy Security Conference in Vilnius, Lithuania to discuss how to reduce the dependence of vulnerable countries on Russian energy resources and pipelines. Azerbaijan, Georgia, Lithuania, Ukraine, and Poland signed an agreement to fund a feasibility study on the Odessa-Brody extension project.

The success of these projects depend more on their profitability and on the interest of private energy firms than on US diplomatic skill and energy (Woehrel (2007)). In addition, it is not clear whether sufficient oil and gas supplies exist for the various US supported alternative routes.

In addition to diplomacy, the US has been involved in the following initiatives:[38]

- Funding feasibility studies for some pipelines routes;[39]
- Working with Ukraine to develop an energy efficiency action plan for the country;
- Providing small amounts of aid to the countries of the region to help build their energy security.

2.6 / Conclusions and recommendations on EU energy policy toward the region

The EU Communication 'An Energy Policy for Europe' (COM(2007)1 final) and the following energy and climate package of 23 January 2008 as well as the third internal market package, have placed EU energy policy on a new footing, with a wide range of proposals. Importantly, it addresses energy from several angles – security, savings, alternative energies, etc– and in the context of climate change issues. While the 'green' aspects of the policy are important, it is clear that a main driver has been a call for the EU to find a way to overcome the independent action of member states acting in their own interests with regard to securing oil and gas contracts, as opposed to in a coordinated way in the Community, and secondly to present a stronger bargaining bloc to the increasingly powerful suppliers like Russia and OPEC. Although presented under the same umbrella, very little of the external policy and the green aspects overlap.

For example, the Policy presents an Action Plan which includes an ambitious program of energy efficiency measures at Community, national, local and international level. However, only OECD and key developing countries (such as China, India and Brazil) are supposed to take part in a proposed "new international agreement on energy efficiency". The Action Plan also focuses on increasing the share of *domestically produced* renewable energy and suggests to engage third countries only with regards to biofuels production.

The EU is attempting to consolidate its energy policy internally to present a unified face externally, while at the same time greening its energy supply, its external energy programs and policies seem neither particularly coordinated, nor particularly green. Although the number of policies and programs may indicate an increasing importance placed on good relations with the region (i.e. ENP, Baku Process, INOGATE, Energy Community Treaty, etc.), the existence of many overlapping regional initiatives – "a jungle of agreements, alliances, and acronyms" (Tassinari, 2006) – has produced a dispersion of resources.

On the basis of the previous analysis, a number of recommendations can be drawn:

1) Adopting a common EU energy policy for the Black Sea Region. This would require agreeing on a common approach to Russian energy, an issue still outstanding. As noted by Smith (2007), European countries continue to strike bilateral deals with Russia, with little consideration for common EU interests, which calls into question the extent of EU solidarity regarding energy supplies. A common policy may temper fossil fuel projects by bringing them into line with the sustainable energy goals being pursued at EU level.
2) Developing transparent and competitive mechanisms to attract private investors to purchase and operate energy assets. Access to financing mechanisms could be facilitated to potential developers and users of renewable energy sources and to those likely to undertake energy efficiency projects[40] (based on IEA, 2006).
3) Providing technical and economic support to ensure that the countries in the region can base their energy strategies on solid energy data, economic models and demand projections. This could be achieved for instance by improving data collection and adopting international statistical methodologies. A cost-benefit analysis of policy options could also be conducted in order to develop realistic policies to support renewable energy (based on IEA, 2006).
4) Helping the countries in the region to take full advantage of opportunities offered by the Kyoto Protocol, which requires establishing the institutional and legal framework, and developing a credible greenhouse inventory and registry. For instance, Ukraine has major opportunities through the Kyoto Protocol to finance energy efficiency and renewable energy. However, the government has been slow to pursue these opportunities and only approved rules for hosting Joint Implementation projects in 2006 (IEA, 2006).
5) Helping ease the pain of rising energy prices and of phasing out existing subsidies for fossil fuels in order to ensure that prices cover the full, long-term cost of energy supply[41] (IEA, 2006).
6) Ensuring that its policies do not just approach fossil fuel carbon emissions as an end-of-pipe issue, but consider the full footprint, placing more emphasis on concerns of producer regions than otherwise.

38 Woehrel, 2007.
39 In August 2007 the Trade and Development Administration (TDA) provided $1.7 million for feasibility studies on building both an oil and gas pipeline across the Caspian Sea to link to the BTC pipeline and the South Caucasus gas pipeline. The Export-Import Bank has also provided funds for pipeline projects (Woehrel, 2007).
40 For instance, in 1994 Ukraine set up an energy efficiency policy, which could not be fully implemented due to insufficient funding. Currently, Ukraine has one of the most energy-intensive economies in the industrialized world.
41 As noted by IEA (2006), greater energy efficiency will be much easier to achieve if domestic prices reflect the full, long-term costs of energy.

7) Mobilizing other EU financial instruments available in the region, such as the European Investment Bank,[42] the European Bank for Reconstruction and Development[43] as well as those of other international financial institutions committed to the EU's energy security (under the condition that the associated investments are truly sustainable). In addition, the Global Energy Efficiency and Renewable Energy Fund (GEEREF)[44] could help find additional financial resources.
8) Organising capacity building and training programmes to raise awareness on how to facilitate the entry of renewable energy sources on the energy market.
9) Put even more emphasis on the implementation of the energy-related provisions of the ENP Action Plans'
10) Promoting climate change adaptation. Although the countries in the region may not consider the environment a top priority, the region will be confronted with the consequences of climate change and concrete action should be taken with regards to adaptation. This would include soft, relatively inexpensive measures, such as water conservation, public planning and awareness rising, developing partnerships and also improving disaster or crisis management. In addition, adaptation will also bring new economic opportunities, including new jobs and markets for innovative products and services. At a regional level the development of specific technical guidance documents, case studies and good practice should be considered in order to define cost-effective adaptation measures. EU support to the Black Sea Region is envisaged under the Green paper from the Commission "Adapting to Climate Change in Europe – Options for EU Action" (COM(2007)354 final). Thus, concrete cooperation action, exchange of experience, best practices and projects on the ground should be initiated through EU instruments.

42 The European Commission proposal for the new European Investment Bank external lending mandates for 2007-2013 foresees a considerable increase in the lending ceilings for the neighbouring countries. A specific memorandum of Understanding has been signed between the Commission, the EIB and the EBRD to facilitate cooperation in Russia, Eastern Europe, Southern Caucasus, and Central Asia (Memorandum to the Commission, Annex I, Annual Action Programme covering the Regional Strategy Paper 2007-2013 and Regional Indicative Programme 2007-2013 for the ENPI East for 2007).

43 For instance, the European Bank for Reconstruction and Development (EBRD) in cooperation with the Bulgarian Government and the EU developed in 2004 the Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) – see the Bulgarian fact sheet for additional information.

44 The GEEREF is an innovative financing instrument proposed to the European Commission. It will be set up as a global public-private partnership which will offer risk-sharing and co-funding options for various commercial and non-commercial investors. It will engage in the creation and funding of regional sub-funds or the scaling up of similar existing initiatives. The fund will include a technical assistance facility to engage local and international technical expertise. The initial funding target is set at €100 million and the focus will be on projects below €10 million. The European Commission will contribute €80 million over four years and the first sub-funds should be established by the end of 2007. See the COM(2006) 583 final, "Mobilizing public and private finance towards global access to climate-friendly, affordable and secure energy services: The Global Energy Efficiency and Renewable Energy Fund", Brussels, 6.10.2006
(http://ec.europa.eu/environment/climat/pdf/key_elements.pdf).

Chapter 3 / TRANSPORT POLICY IN THE BLACK SEA REGION

3.1 / Introduction

After the historic EU enlargement to include 10 countries of Central and Eastern Europe and the Mediterranean in 2004, Romania and Bulgaria joined the Union at the beginning of 2007. As a result of the EU's expansion to the Black Sea coast a new geopolitical and economic situation has been established in the region, which will in turn influence the Black Sea ecosystems. The Black Sea plays a great role as a transit area. Traffic flows use seven (or more) international transport corridors passing through the Black Sea region with a total capacity of up to 1 billion tonnes of cargo per year. Currently, freight with a value of $600 billion is transported between Europe and Asia annually. Cargo volumes between the two continents are expected to increase by 30-35% until 2010.

The European Commission Communication on "Guidelines for transport in Europe and neighbouring regions"[1] outlines an ambitious policy which aims to create an effective transport market between the EU and its neighbours and to disseminate the principles of the internal market. The Communication identifies the five most important transport axes for international trade between the Union (including the BS Region[2]), its neighbouring countries and beyond. It also sets out a package of measures to shorten journey times along these axes including infrastructure improvements, streamlining customs procedures and reducing administrative obstacles. Transport (shipping, inland navigation, road transport and rail) is a key sector for cooperation in the context of the Black Sea Synergy. The EU has committed to continue actively supporting regional transport cooperation in the Black Sea with a view to improving the efficiency, safety and security of transport operations. The EU would build on the experience of all the various transport initiatives relevant to the Black Sea area.[3] Efforts should continue in the context of developing the transport axes between the Union and the neighboring countries and enhancing coordination with ongoing initiatives such as TRACECA. At the same time, a transport policy dialogue is encouraged to underpin regulatory approximation, which remains a central goal for the EU. The Commission intends to assist in identifying those actions that will help to achieve the uniform and consistent application of relevant instruments and standards. Given the growing demand for fuel transport, maritime safety must also be central to the agenda. The Commission intends to support further development of short sea shipping and inland waterway infrastructures, most notably on the Danube. Development and implementation of EU commitments towards a sustainable transport policy in the region will necessitate improved environmental protection standards, the development of new structures, legal procedures, as well as new safety standards. Implementation of this ambitious plan requires pooling together all relevant financial sources, both public and private as well as national and international. In this vein, the European Neighbourhood and Partnership Instrument (ENPI) and its "Neighbourhood Investment Facility" as well as the EIB and the EBRD are the major sources/donors.

The aim of this chapter is to assess the main trends of transport development in the Black Sea region, its potential environmental impacts, as well as the role of the EU and the governments of the neighbouring countries. Finally, this chapter will make recommendations for improving regional transport policies.

3.2 / Transport policies and initiatives

Trans-European Transport Network (TEN-T)

The trans-European transport network (TEN-T) is an ambitious policy initiated by the EU in the early 1990s to promote linkages between national transport networks within the EU. The central aim of the TEN-T policy is to reinforce the competitiveness and cohesion of the enlarged Union by improving connections within the internal market. The network has been progressively extended to the new (and potentially new) member states. Proposals for the TEN-T extension to the neighbouring countries were made by the High Level Group in 2005[4] and have been taken forward by the EC.[5] Plans for new projects and routes are currently under discussion. Today the geographical scope of the TEN-T goes beyond the EU's immediate neighbourhood and is laying the policy groundwork for links to Asia. In the context of such a policy, one must bear in mind that the Black Sea plays a vital role as a living environment and ecosystem, as well as presenting great potential as a freight transport corridor. Environmental safeguards are clearly needed if the ambitious transport infrastructure plans are to be realized without serious, irreversible damage.

1 IP/07/119
2 Central axis: to link the centre of the EU to Ukraine and the Black Sea and through an inland waterway connection to the Caspian Sea. A direct connection from Ukraine to the Trans-Siberian railway and a link from the Don/Volga inland waterway to the Baltic Sea are also included.
3 COM(2007) 160 final
4 See http://europa.eu.int/comm/ten/transport/external_dimension/index_en.htm
5 Commission communication, COM(2007) 032 of January 07

In July 1996 the European Parliament and Council adopted Decision No.1692/96/EC on Community guidelines for the development of the trans-European transport network (TEN-T). These guidelines cover roads, railways, inland waterways, airports, seaports, inland ports and traffic management systems which serve the entire continent, carry the bulk of the long distance traffic and bring the geographical and economic areas of the Union closer together. TEN-T development has not advanced as rapidly as planned. Delays in realizing projects are largely blamed on funding shortfalls on the part of the EU member states. As indicated in the 1998 TEN-T implementation report, the investments in the trans-European network projects in 1996-1997 were about €38 billion, while the financial resources needed to complete the network to 2010 were estimated to be €400 billion. A fundamental revision of the TEN-T Guidelines was undertaken by the Commission at the end of 2003, to take account of enlargement and expected changes in traffic flows. New outline plans and projects for 2020 were drawn up to connect the new member states and provide accessibility to the internal market. In this context, the Commission introduced the concept of "motorways of the sea" (MoS) and included plans to extend some pan-European corridors into accession and candidate countries. MoS projects are planned for the Baltic, Barents, Atlantic, Mediterranean, Caspian and Black Sea regions, and their coastal areas, as well as a link to the Red Sea via the Suez Canal.[6]

Extension of the TEN-T to neigbouring countries

A high-level group was established by the European Commission in 2004, to investigate the possible extension of major transport axes into neighbouring countries and regions. The group was chaired by former Commission Vice-President Loyola de Palacio. The report[7] of the group was submitted to the Commission in December 2005. Serious concerns were raised during the public consultation process regarding the inclusion of environmental and social aspects.[8] The group selected five transnational transport axes for EU-supported development (see following section).[9]

The EU launched exploratory talks with neighbouring countries in spring 2007 to discuss the development of these transport axes and further develop a transport policy dialogue.[10] The next steps in the talks will aim to secure the signature of agreements with the neighbouring countries, the creation of regional structures for the axis and the consolidation of the existing ones. The Commission plans to propose a more comprehensive policy relevant to the extension of transport infrastructure beyond the EU borders, including discussion of relevant legislation. The policy should lead over time to the development of common rules and regulations for the transport sector.

The Commission is currently developing a new set of guidelines that will be applied to the extension of TEN-T in the EU, its neighbouring countries and to the entire European continent. An assessment of the traffic flows and the potential environmental impacts is being conducted. A Green Paper is scheduled for late 2008 which will make proposals on the future development of TEN-T inside and outside the EU.

EU maritime policy

An integrated maritime policy for the European Union (Blue Paper, October 2007) updated the strategic vision for the development of competitive, safe and secure shipping, as well as ports. The Commission will propose a new port policy, taking into account the multiple roles of ports in the wider context of European logistics; make proposals to reduce the levels of air pollution from ships in ports[11], namely by removing tax disadvantages for shore side electricity; and issue guidelines on the application of the relevant Community environmental legislation to port development.

Surveillance: The Commission will seek to develop enhanced co-operation on 'European Border Surveillance System (EUOSUR)'. Secondly, the Commission will develop the organisation of offshore activities for maritime areas in the Black Sea.

Co-operation: Regional co-operation in maritime affairs will be enhanced under the Association and Partnership Agreements. The Marine Strategy Directive , the environmental pillar of the Maritime Policy, provides that "Member States shall take the necessary measures to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest". The Black Sea is specifically mentioned as requiring an "assessment of its environmental status".
EU Black Sea member states will need to co-operate with third countries bordering the Black Sea to bring about the necessary environmental improvements.

3.3 / Existing and planned transport corridors

Pan-European Corridors

Pan-European Corridors and Areas (PEC) were developed during two ministerial conferences in Crete (1994) and in Helsinki (1997) with the aim of connecting the EU-15 with the then neighbouring countries. Following the 2004 and 2007 enlargements, the corridors are now mainly within the EU and thus part of the TEN-T network. The cooperation along the PECs is organized through non-binding

6 Commission Decision of 23 May 2007 establishing a draft of the multi-annual work programme for grants in the field of trans European Transport network (TEN-T) for the period 2007-2013 // http://ec.europa.eu/dgs/energy_transport/grants/doc/2007/rte_t/2007_2013_com_2007_2158_en.pdf
7 See http://europa.eu.int/comm/ten/transport/external_dimension/index_en.htm
8 The written and oral contributions for both consultations can be downloaded from: http://ec.europa.eu/ten/transport/external_dimension/hlg/index_en.htm
9 COM(2007) 032, p.6
10 Commission communication COM(2008) 125 final of March 05, 2008.
11 The EU's Maritime Policy is a broad policy for the management of the European seas which involves action in a number of different policy areas. It is not specific to the transport sector or to environmental protection

Memoranda of Understanding (MoU), which often also establish a Secretariat for each corridor. The financing of the Secretariats is the responsibility of one country along the corridor, but this has been uneven and much depends on the particular circumstances of the PEC. The following weaknesses have been identified: planning and prioritisation of investments is in most cases undertaken in a piecemeal fashion that follows national logic and neglects the needs of international movements along the whole axis; the focus is on infrastructure and insufficient attention is paid to removing non-infrastructure related bottlenecks, which are often the primary cause of delays, particularly at border crossings; and there are no commonly agreed methodologies to assess the economic, social and environmental impacts of plans and projects that would meet the standards of international best practice.

TRACECA

The TRACECA corridor has been developed since 1993 to connect Europe with Turkey, the Southern Caucasus and Central Asia. It was conceived as an alternative to the North Trans-Siberian route and to support the political and economic independence of the Commonwealth of Independent States (CIS) countries, and afterwards, also of the countries to the Basic Multilateral Agreement on international transport for development of the Europe-Caucasus-Asia Corridor. It is the only corridor with a multilateral agreement signed by the countries concerned. Nevertheless, the institutions established under this agreement and its policy dimension need to be strengthened and modernized. Until 2015 TRACECA should continue to provide an important basis for regional transport development but should be progressively merged with the Baku policy process and become part of the set up proposed by the HLG.

Axis proposed by the HLG

Three of the corridors proposed by the HLG are relevant for the Black Sea region:

1) The Central Axis should link the centre of the EU with Ukraine and the Black Sea and through an inland waterway connection to the Caspian Sea. A direct connection from Ukraine to the Trans-Siberian railway and a link from the Don/Volga inland waterway to the Baltic Sea are also included (Appendix D);
2) The South-Eastern Axis links the EU with the Balkans, Turkey, the southern Caucasus, and the Caspian Sea. As a result of the exploratory talks, the Commission has proposed to split the South-Eastern Axis into two branches both involving Turkey: one to the Caucasus, that would be covered under TRACECA, and another one to Egypt;
3) The Motorways of the Sea link the Baltic, Barents, Atlantic, Mediterranean, Black and the Caspian Sea areas as well as neighbouring coastal countries. The concept is under construction and remains vague. It is not clear how it will be taken forward operationally.

The Black Sea Ring Highway, BSRHW

This initiative is promoted by BSEC and foresees the construction of a high capacity highway running all along the Black Sea coast. The BSRHW length would be about 7 140 km and will run as follows: Istanbul (Turkey) – Samsun (Turkey) - Trabzon (Turkey) – Batumi (Georgia) – Poti (Georgia) – Novorossiisk (Russia) - Rostov-on-Don (Russia) – Taganrog (Russia) – Mariupol (Ukraine) – Melitopol (Ukraine) – Odessa (Ukraine) – Chisinau (Moldova) – Bucharest (Romania) – Khaskovo (Bulgaria) – Edirne (Turkey) – Istanbul (Turkey) and Komotini (Greece) – Alexandrupolis (Greece) – Istanbul (Turkey).

A Memorandum of Understanding was signed by most members of the BSEC Council of Ministers of Foreign Affairs in April 2007. More recently, in their Kiev Declaration of February 2008, the Ministers have invited the EU to join the efforts in the development of interconnection and transport infrastructures with special mention to the BSRHW.

The BSRHW represents an enormous threat to key environmental sensitive areas in the BSR such as Danube Delta that would be bypassed by the project. Besides, the project will have serious difficulties to be implemented in the areas of conflict in the Black Sea region. For instance, there are serious doubts that the Abkhaz authorities will allow the highway to be built from Georgia across their land to Russia. It would be very expensive to build around Abkhazia as the area directly to the East is far too mountainous for a big motorway, and includes the highest mountain in Europe, Mount Elbrus at 5621m.

National strategies

The identification of core networks in BS regions has gone some way to addressing the weaknesses of the Pan-European Corridors. These exercises, supported under the accession framework and the bilateral action plans of the European Neighbourhood Policy, aim to improve the policy implementation and infrastructure of the regional transport systems: Turkey is in the process of identifying a core network and a list of priority infrastructure projects as part of the accession negotiations. Turkey is involved in both the Pan-European Corridors and the TRACECA corridor. For Belarus, Moldova and Ukraine, the Pan-European Corridors remain the reference network. Transport is part of the negotiations of the new Enhanced Agreement with Ukraine. Regarding Russia, cooperation in transport is established under the EU-Russia dialogue that was launched in 2005. Caspian and Black Sea cooperation is established as a follow-up to the EU-Black Sea-Caspian Basin Transport Ministerial Conference in 2004 in Baku and it brings together the TRACECA countries, Russia and Belarus as part of this "Baku process".

3.4 / Effects on environment from transport

Marine transport

Expert forecasts predict that the main annual volume of transit cargo through the Black Sea to Europe will grow to 500 million tonnes in the nearest 5-10 years (see Appendix F). The main environmental concerns linked to marine transport influence in the Black Sea are: oil spills and other contaminations, introduction of invaders in ballast waters, dredging, coastal transformation due to the development of port infrastructure, CO_2 emissions and other gases with an impact on climate and air pollution.

Oil spill risks in the Black Sea

According to the UN Convention on the Law of the Sea of 1982 the Black sea corresponds to the status of "enclosed or half-enclosed" sea. The unique nature of hydrobiological indexes and recreational resources of the sea merits special consideration of its ecosystem. The planned future capacity of oil terminals on the Black Sea's Eastern coast is approximately 150 million t/year (and up to 350 million t/year in the more distant future). The maximum volume limit for the transport of oil products through the Bosphorus of 146 million tonnes per year is already met. Oil transport is also increasing in Russian ports, for example in the Kerch channel and in Tuapse. "River-to-sea" vessels carry oil deliveries from Russian ports to Constance. Practically all Black Sea countries aim to increase the shipment volumes of oil. Taking into account technological losses, about 300 thousand tonnes of oil products can contaminate the marine environment in the Black Sea port areas each year. Port infrastructure development will clearly have a considerable influence on the transformation of shore areas. There are more than five major oil terminal projects in the eastern part of the BS region. Terminals are also being developed on the Taman peninsula. On the other side of the sea, Bulgaria and Romania also propose to construct new terminals (see Appendix G).

Air pollution and Climate Change

Maritime transport is the backbone of globalization. Bigger, faster and more efficient ships have integrated the most distant regions into the world market. Maritime transport has become a large and rapidly growing source of local air pollution and greenhouse gas emissions. The fuel consumption of a cruise ship is equivalent to 12 000 cars. The exhausts of diesel engines of large container vessels during entrance to and exit from the port release air pollutants equivalent to those produced by 300 000 cars per hour.[12] A recent report presented by a working group of the International Maritime Organization (IMO) estimated that worldwide fuel consumption by ocean-going vessels was in the range of 332 – 406 million tonnes of bunker fuel per year (with an estimated average of 368 million tonnes). Such fuel consumption would represent a total of 1 121 million tonnes of CO_2 emissions in 2007, with an estimated increase to 1 478 million tonnes of CO_2 by 2020. By comparison, total emissions from transport in the EU in 2005 were estimated to be 1 247 million tonnes, which shows the importance of shipping as a global growing source of CO_2 emissions.[13] Another problem associated with fuel consumption from ships is the emission of air pollutants. Sea-going ships typically use types of fuel oil with very high sulphur content, leading to massive emissions of SOx. Moreover, the lack of stringent regulation to vessel engines also leads to significant NOx emissions. According to the European Commission, emissions of NOx and Sox from ships in the EU in 2020 are likely to exceed those of all land-based emission sources together.[14] Particulate (PM) emissions are an associated problem, particularly in harbors. While ships tend to be a relatively environmentally friendly mode of transport, seen on a per km basis, due to the growing volumes of maritime transport globally their overall contribution to climate change and air pollution is dramatically increasing. This reflects the failure of the IMO to adopt policies and measures that effectively reduce emissions from ships. Given this, further development of maritime transport in the Black Sea should be accompanied by measures to ensure that incentives to reduce emissions from ships are in place.

The European Commission is preparing measures to address the climatic impacts of ships. A report by CE Delft points to several policy options that could be implemented if the IMO continues to not address this issue. One of the most promising options seems to be the inclusion of maritime transport in the EU Emissions Trading Scheme.[15]

To address air pollution from ships there are several policies under discussion at the IMO and EU-level and a proactive approach should be taken if major impacts are to be avoided. At IMO-level, measures to reduce the sulphur content of fuels and to regulate NOx emissions are under discussion. This "at source" policy is likely to produce results, and the Commission has confirmed that EU measures are to be expected in this field.

Regional and local measures can also be taken. For example, the North and Baltic seas are recognized Sulphur Emissions Control Areas (SECA), a provision that obliges ships to use fuels with lower sulphur content in these marine areas. It would be extremely important to ensure that the Black Sea also becomes a SECA since it would dramati-

12 http:// www.earthjastis.org/background/ocean-pollution-global-shiping-and-the-cruise-indusrtry.html
13 Input from the four subgroups and individual experts to the final report of the Informal Cross Government/Industry Scientific Group of Experts. International maritime organization, sub-committee on bulk liquids and gases. 28 December 2007.
14 European Commission (EC). 2005. The Communication on Thematic Strategy on Air Pollution. Belgium.
15 CE Delft. Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive. December 2006.

cally cut SOx emissions with positive side-effects on particulate emissions. Moreover, measures can also be taken at port level, for example the use of shore-side electricity to provide power for ships when at ports.[16] Harbor or fairway fees differentiated to promote the use of efficient engines are also promising policy tools which are already readily available.[17]

Dangerous invaders

Foreign species transferred between regions in ballast water tanks create considerable problems for the maritime environment and for the stability of ecosystems, and thus threaten the economy and health of the population of seashore regions. Among foreign species recently brought to the Black Sea 34% are brought for aquaculture, and 66 % were transferred to the Black Sea as marine larvae in ballast waters and/or as the organisms attached to the vessel's hulls.

Damping

Damping of soil because of dredging in ports and canals creates the additional sources of contamination with heavy metals and oil. The number of areas of soil damping has increased from 12 to 15, and will increase with the growth of shipping in the region.

Inland Waterway Transport

In January 2006 the European Commission published a Communication on the Promotion of Inland Waterway Transport (IWT) setting out the Action Programme "NAIADES".[18] The Commission plans to support IWT on the Danube by granting financial support under the TEN-T and NAIADES programs. The Commission plans to grant budget support for these programs of approximately €20.35 billion from 2007 to 2013.[19] The TEN-T report[20] on Priority Axis 18 (Rhine/Meuse-Main-Danube) states: "To give access to vessels of up to 3 000 tonnes, a minimum draught of 2.5 meters is required along the entire length of the waterway". The background report[21] for the NAIADES Programme translates this tonnage capacity into 3.50 m to 4.00 m draught, which implies drastic adaptation of the river. This scenario would result in an ecological disaster for the Danube considering its current ecological status.[22]

There are plans to build the Dnieper-Daugava canal over the course of ten years. The canal is intended to provide a transport connection between Kherson (Ukraine) and Riga. In theory, the canal could carry up to 240 million tonnes of cargo, but the building of the canal bears certain threats for the ecosystem of the Dnieper. The proposed waterway includes navigation through the Pripyat River. Some sections of the Pripyat River will be marred by bottlenecks and are listed as being not sufficiently deep for navigation:[23] Removal of bottlenecks will require intensive dredging, which could be problematic since these sections of the river lie in territories contaminated as result of the Chernobyl accident in 1986. The dredging of sludge and bottom soils that are heavily contaminated with radionuclides creates the risk of spreading radiation.[24]

In the general structure of Black Sea oil transit, Russian oil transporting by river ships through the Don with a subsequent raid reload on marine ships in the Kerch channel (1.7 million t/years) is substantial. Russian transport policy resulted in the damage or grounding (low-water) of more than five vessels during bad weather conditions on 11 November 2007. This re-emphasises the need for careful consideration of potential negative consequences of development and intensification of traffic on Danube ecosystems (taking into account, for example, the building of the oil port in Dzhurdzhuleshty (Moldova), ISPA Project (Romania), Bystroye canal (Ukraine)) (Appendix F). In this context, the EC should support the International Commission for the Protection of the Danube River (ICPDR) initiative to oversee new projects and the development of navigation of the Danube.[25]

Inland navigation may be in general more energy-efficient than road and air transport, but it can also create serious ecological impacts on a local scale and emissions are comparable to those of rail transport.[26] Inland waterway transport can only offer a sustainable alternative to road or air transport if navigation routes are integrated into a sustainable distribution network in the target countries, multimodal logistics infrastructure is improved, and a balance is found between environmental, transport and socio-economic needs.

16 For more information on shore-side electricity there is a Commission recommendation on the promotion of shore-side electricity for use by ships at berth in Community ports (2006/339/EC).
17 Transport and Environment Review Of CO_2 Abatement Policies For The Transport Sector // European Conference of Ministers of Transport Council of Ministers/ CEMT/CM(2006)4/FINAL 18 Communication From The Commission First progress report on the implementation of the NAIADES Action Programme for the promotion of inland waterway transport / COM(2007) 770 final, Brussels, 5.12.2007
18 Communication From The Commission First progress report on the implementation of the NAIADES Action Programme for the promotion of inland waterway transport / COM(2007) 770 final, Brussels, 5.12.2007
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Railways

Railways play a major role in the development of transport links in the Black Sea region. For example, in Russia up to 75% of cargo is transported by rail. In Ukraine, the share for rail is 23-25% of freight transport. The main adverse environmental effects from (non-electric) locomotives and rail wagons are emissions of air pollutants, greenhouse gases and noise pollution. In addition, construction and operation of railways requires substantial usage of land.
The main pollutants are locomotive exhaust gases, oil products, phenol, aerosols, and waste. Ukrainian railway transport uses approximately 170 million m^3 of water per year. Almost 50% of this water is used for operational and drinking purposes, while unrecoverable water losses exceed 40%. Annually, the railways discharge more than 20 000 tonnes of pollutants into the sewage systems and natural waters. Half of this waste is untreated.

Air emissions

The risk of hydrocarbon emissions is highest during storage and usage of oil products. Burning 1 kg of oil products releases emissions of 0.25 kg of hydrocarbons, and the burning of 1 kg of coal releases 0.16 kg. However, considerably more pollutants can be emitted during shunting or maneuvering. In addition, refrigeration wagons are filled with ozone depleting substances (Freon), which, if leaked, damage the global balance of ozone in the stratosphere. Each refrigeration wagon is filled with 35 kg of Freon.

Noise

The main source of rail noise is the contact between the wheel and the rail.[27] This problem concerns of course both passenger and freight transport, but it is much more acute for freight wagons. To reduce rail noise at its source the Commission has adopted 'technical specifications for interoperability' (TSI) relating to railway rolling stock, including noise limit values for newly manufactured and upgraded conventional and high-speed trains.[28] New freight wagons have to be equipped with low-noise brake blocks which reduce noise by up to 50%. However, a serious obstacle to reducing railway noise is the fact that wagons and locomotives have very long lifetimes. The average lifetime of rail wagons in the EU is around 40 years. In new member states, accession and neighbouring countries, the fleet average age is likely to be even older, and therefore much noisier. This means that the new noise standards from the TSIs do not apply to a very substantial proportion of the railway fleet. This problem unfortunately cannot be solved without investment to phase-out the traditional cast iron braking systems of older wagons. Railways are in competition with road transport, which is perceived as being more convenient but has higher emissions. In addition, railway improvement projects are often carried out later than parallel motorway construction projects. In Central and Eastern Europe, the rail networks are often extensive, but lack of investment and political support is contributing to their decline and even the closure of certain lines. Political decisions are central to setting conditions for competition between modes of transport. Railways in Central and Eastern Europe will need political commitment and substantial investments if they are to increase or even maintain their modal share.[29]

Road transport

Road transport constitutes a very large and growing proportion of land transport in Europe: 44% of freight is carried by truck (61% in Ukraine) and 85% of passengers by cars, buses or coaches. Road transport incurs very high external costs, in terms of air pollution, greenhouse gas emissions and noise, and also congestion and road traffic accidents. These costs are generally paid by society in general (taxpayers) and not reflected in the price of road transport, which in part explains the growth of road transport compared to other modes. Road transport generates about one-fifth of the EU's CO_2 emissions, with private cars responsible for around 12%. In Europe, transport is the only sector blatantly flouting the Kyoto Protocol by increasing GHG emissions since 1990, and road transport is the biggest contributor. The rapid increase in private car ownership and road freight transport in Central and Eastern Europe is clearly linked to serious air quality problems in cities and along major transport corridors. Whilst new cars are becoming cleaner, the fleet is on average considerably older in new member states, accession and neighbouring countries, and therefore uses more polluting and less fuel-efficient technologies. Large cities of the Black Sea region (Odessa, Yalta) have very serious air pollution problems. The EU policy objectives for road transport include: promotion of efficient road freight and passenger transport services; creation of fair conditions for competition; promotion and harmonization of safer and more environmentally-friendly technical standards; ensuring harmonization of fiscal and social conditions; and effective and non-discriminatory application of the rules for road transport. The main political concerns are ever-increasing congestion on Europe's roads, the climate impact and fuel consumption of road transport. The European Commission is committed to addressing rising emissions from road transport. In this context, on 7 February 2007, it published two communications on the future strategy to reduce CO_2 emission from cars and on the future regulatory framework for the automotive sector. As outlined in these communications, the Commission has decided to pursue an integrated approach with a view to reaching the EU objective of 120 g/km average CO_2 emissions from new cars by 2012. These new standards will, however, take a very long time to filter into the vehicle fleet in Central and Eastern Europe and the Black Sea region.

27 Directive 2002/49/EC
28 http://ec.europa.eu/transport/rail/environment/noise_en.htm
29 CEE Bankwatch Network comments on the HLG report on TEN-T extension to the neighbouring countries.

Road infrastructure – Case Study

In 2002 the Lviv-Krakovets highway construction project was developed by the "Transmagistral" consortium (see Appendix H). The planned width of the highway is 30 meters and the highway capability should be about 20 000 vehicles per 24 hours. The approved Lviv-Krakovets project highway will go through the territory of the villages of Zashkiv and Zavadiv and damage a lake with high recreation potential. Seven homes will be demolished because they are located on the construction site. The major problem is that the project envisages only 10 m either side of the highway to be determined as a zone with a protective regime where residential houses and agricultural production should not be allowed. According to Ukrainian legislation the distance must be between 25 m and 100 m for roads in the state network and for this category of highways the protective zone should be 300m. Many residents' homes are located in the 25-300 m strip along the motorway and they will be significantly affected by the motorway construction. Resettlement of the residents from Zashkiv and Zavadiv villages from the protective zone is not foreseen. Thus the motorway construction violates the right to a safe and healthy environment for these people, vested by Article 50 of the Constitution of Ukraine.[30]

3.5 / Conclusions and recommendations

The initiative for the development of road transit corridors through BS countries could seriously harm the development of sustainable transportation there. The BS countries should be urged to develop and discuss a coherent transport policy with the public, including the development and management of the local and regional transport networks. Technical support from the EC for the proper implementation of Strategic Environmental Assessments on national transport policies will be required.

Recommendations to avoid or reduce the environmental impact of EU and national transport strategies

■ The extension of the TEN-T network is potentially a positive development, if managed with due consideration of social and environmental impacts and their costs. Guarantees are needed that together with physical infrastructure, good environmental and democratic practices are developed, such as: public participation and transparency of all the studies related to infrastructure projects; implementation of the precautionary principle for valuable biodiversity, air quality and residents' health; harmonization of environmental and social standards among the donors in the region; giving priority for the upgrading, optimization, interoperability and modernization of the railway sector in neighbouring countries and regions; application of the user / polluter pays principle.[31]

■ Ensure and promote principles of sustainable development by taking into account the economic, environmental and social consequences and costs of infrastructure plans and projects and horizontal measures. Environmental conservation should also be taken into account so as to avoid environmental degradation. In that respect, projects selected for financial support must be subject to an Environmental Impact Assessment (EIA). The EU should require the international financial institutions (IFIs), including the World Bank, to follow the recommendations of High Level Groups (HLG), while financing the parts of TEN-T extension projects in different countries. The ideal strategic planning of transport infrastructure would include strategic environmental assessments (SEA) covering transport based on multi-modal transport corridor analysis, along with non-transport demands on the roads, railways and waterways. The idea that economic development will automatically follow the routes of new transport infrastructure is now generally viewed as outdated in Western Europe. The current and future costs, benefits, and needs for transport infrastructure must be assessed along with possible alternatives for attaining the main policy objectives. For example, if the main objectives expected from the infrastructure development are economic growth, employment or regional development, authorities should consider education, training or technological programmes as potential policy alternatives.

Recommendations to harmonize legislations

■ National Transport Strategies in the Black Sea countries should prioritize the harmonization of their transport legislation and regulations with EU standards.

■ Incorporation of TRACEA into TEN-T could give additional benefits: the propagation of EU environmental requirements has the potential to reduce the negative impacts of transport (and future developments) on the environment in the region. Multilateral cooperation, in particular in the context of the implementation of the TRACECA strategy until 2015 and the Baku process, as well as the plans for a Mediterranean regional transport action plan complement the bilateral action plans.

30 CEE Bankwatch Network comments on the HLG report on TEN-T extension to the neighbouring countries
31 CEE Bankwatch Network comments on the HLG report on TEN-T extension to the neighbouring countries

■ Promote interoperability of networks between the EU and the neighbouring countries and further approximation of legislation and policies in the neighbouring countries towards EU standards with a view to ensuring continued economic and social development and environmental sustainability. Speeding up border crossing procedures by implementing without delay the relevant international conventions, as already adopted in the EU, by introducing "one-stop" offices through shared facilities, simplification and harmonization of trade and transport related documentation in line with the EU practice.

Recommendations on the adoption of new legislative framework

■ Beginning preparations is recommended towards the signature of a Protocol (or similar document) on the protection and rational use of the Black Sea between the EU and the BS countries. The Protocol should include sections on: ballast waters; oil contamination; marine traffic regulation; technical questions of environmental safety; cooperation between marine transport and inland waterways; ensuring high quality in transport vehicles, vessels and infrastructure.

■ To develop the law on unified environmental taxation for freight transport through the BS region and exclusive use of revenues raised for nature protection purposes. Ensure that all existing and/or new ports and terminals satisfy the MARPOL convention requirement for special zones.

■ EIA must be carried out for all planned transport infrastructure projects (see Appendix G). The projects identified for funding should undergo all assessments required by EU legislation, as well as meet the requirements of Espoo Convention, MARPOL Convention, Black Sea and Aarhus Conventions. The current list of projects should be considered to be merely indicative. More detailed plans for the transport axes should be developed. These plans should be subject to strategic, economic, environmental and social impact assessment in line with best international practice and when relevant with EU legislation.[32]

Recommendations of a technical nature

■ Standardization and harmonization of rules on customs, environmental, sanitary and other types of control. Introduce and promote resource- and energy-saving technologies and minimize energy consumption in transport. Implement new technologies including traffic management and information systems in all modes (notably ERTMS[33] and SESAR[34]), including satellite navigation (Galileo). Elaborate new state construction norms for highways, railway lines and navigation canals in Ukraine. Carry out human health assessments, particularly of children's health, in settlements situated near international transport corridors. Investigate possibilities to construct transport corridors away from natural habitats / corridors and protected areas and areas reserved for future protection.

■ For the development of environmentally sustainable sea transport the following steps are necessary: refusal of using of single-hull tankers; creation of "rescue ports" equipped with the infrastructure to help vessels avoid incidents; ensure availability of detergents to manage oil spills in sea ports; equip local tug boats with facilities to deliver and apply such detergents at oil spill sites; identify in cooperation with other parties to the Convention on the Black Sea places for safe storage (or transshipment) of damaged tankers; development of clean-up facilities in ports; develop a system to ensure (ecologically) safe freight transport. Measures to resolve the ballast water problem might include: disposal facilities for ballast waters and replacement of aquatic ballast at sea; on-board processing of ballast waters. To reduce air pollutant and greenhouse gas emissions from vessels in port it is necessary to introduce programmes and requirement for shore-side electricity provision and limits to engine running whilst in port.

■ The countries of the Black Sea region should strive to achieve EU technical and environmental standards, including EURO vehicle emissions standards, and other cleaner technologies for road transport. This could be achieved by using alternative types of fuel, electric or hybrid vehicles, and developing urban public transport. Traffic management measures, fuel tax increases and "eco-taxes" offer a powerful tool to reduce emissions. Road charges provide strong incentives to increase transport efficiency by rationalizing distribution systems and logistics organisation. Reconstruction of railways assumes wider use of electric locomotives.

Recommendations concerning new plans and strategies

■ The establishment of the European Marine Register should include the possibility to include vessels from Black Sea countries. Other interesting measures include: inclusion of the Black Sea region in activities of the European Maritime Safety Agency (EMSA); improved monitoring of movements of all ships in European waters using the system of GALILEO.

■ The adoption of regional action plans for the development of sustainable transport systems in TRACECA partner countries and their implementation.[35]

32 For practical guidance on the implementation of socio-economic appraisal and on strategic environmental assessment, see the 6th Research Framework Programme projects HEATCO at http://heatco.ier.uni-stuttgart.de/ and BEACON at http://www.transport-sea.net/results.phtml

33 ERTMS is the European Rail Traffic Management System

34 SESAR is the European air traffic control infrastructure modernization programme

35 A Strong European Neighbourhood Policy, Communication From The Commission, COM(2007) 774 final, Brussels, 05/12/2007

■ Preparation of a common Black Sea Transport Development Scheme is necessary and should be based on strategic environmental assessments (SEA) covering transport on the basis of multi-modal transport corridor analysis, along with non-transport demands on the roads, railways and waterways. The scheme should identify the most appropriate scenario from an environmental and social point of view and serve as the framework for investment decision-making.

Other recommendations

■ The public consultation on the extension of the TEN-T into neighbouring countries raised concerns that the further development of some of the transnational axes could have negative impacts on the environment and particularly on biodiversity. Potential conflicts should be identified early and managed pro-actively by using legal mechanisms, arbitration courts and special representatives.

■ There are opportunities for the development of social partnerships, the market for environmental information and technologies, transfer of marine technologies, creation of marine business-clusters. Development and involvement of civil society groups is important in the transport sector in order to bring social and environmental perspectives to the attention of policy-makers and the local community. A series of seminars on greening transport policy for decision-makers in the Black Sea region would be useful to share examples of best practices in transport (infrastructure) development.

Chapter 4 / PEACE, SECURITY AND THE ENVIRONMENT IN THE BLACK SEA REGION

4.1 / Violent Conflicts in the BSR

The Black Sea Region (BSR) is home to a number of protracted violent conflicts which are central to security concerns in the area. Compared to the region as a whole, they are relatively small in scale and size and many of them are often colloquially referred to as "frozen conflicts": despite phases of escalation and de-escalation and ongoing negotiations for many years, they are in a stalemate and unlikely to be resolved any time soon. These conflicts are:

- between Georgia and its two break-away regions Abkhazia and South Ossetia;
- between Armenia and Azerbaijan over the status of Nagorno-Karabakh;
- between Moldova and its break-away region Transdnistria.

Political independence and preserving (cultural) identity are key interests of the break-away regions at stake in these conflicts. They have succeeded in achieving a certain degree of political autonomy, but remain internationally unrecognized. Albeit frozen, the conflicts remain militarized, with numerous irregular troops, peacekeepers and armed forces present in the region. Additionally, Russia has voiced support for Abkhazia, South Ossetia and Transdnistria, providing them with a strong military and economic supporter.

In addition to these frozen conflicts, two further areas of concern exist:

- the North Caucasus and in particular Chechnya continue to suffer from violent conflict despite the proclaimed official ending of the war. Human rights abuses continue while the disappearance of many people during the war remains unresolved (AI 2007; HRW 2007). However, the number of violent incidents is decreasing and reconstruction progresses. While violence will probably continue at a lower intensity, a major escalation is unlikely to happen any time soon (Swisspeace 2007, 2007a, 2007b, 2007c). In addition, the idea that Chechnya could become a battleground for international terrorism (Mateeva 2006: 30) has yet to materialize: the number of actual or attempted terrorist attacks in Chechnya sharply decreased from 31 in 2006 to 4 in 2007 (MIPT 2008). The whole North Caucasus remains a volatile area with regular clashes between government forces and armed groups such as in Dagestan (Swisspeace 2007d);
- the conflict over autonomy of Kurdish areas in Turkey continues and even escalated in late 2007: The Kurdistan Workers Party (PKK)[1] insurgency intensified their attacks from bases in Northern Iraq on targets in Turkey during the second half of 2007. In response, Turkey increased its military presence in the area. One of the most recent escalations was the bombardment of supposed PKK bases in Northern Iraq which strained relations between the two countries (Reuters 2007, 2007a).

Besides these conflicts, political tensions and international disputes between different states in the region also abound. This includes, among others, tensions between Moldova, Georgia and Russia over Russia's support to the various break-away regions, the disputes between Russia and Ukraine over gas prices (Götz 2006) and the Russian Black Sea Fleet stationed in Crimea (Socor 2007). These tensions are unlikely to escalate violently in the short-term.

From outside the region, the diverging interests of global powers, in particular the EU, Russia and the US impact on the BSR: the security spheres of all three of them – manifesting themselves mainly via the North Atlantic Treaty Organisation (NATO) and the Commonwealth of Independent States – overlap in the BSR (Koenig 2007). At a political level, this is not always without conflict. Kosovo illustrates this tellingly: the Russian President Vladimir Putin suggested that if EU Member States and the US recognized Kosovo as a state and its unilateral declaration of independence, Russia would probably do the same with Abkhazia and South Ossetia (Parsons 2006). Irrespective of the actual validity of this notion, raising this issue shows that questions of peace and security in the BSR may also be heavily affected by wider developments.

Finally, the relevance of the BSR for other regions continues to increase, in particular with regards to energy infrastructure. The Baku-Tbilisi-Ceyhan (BTC) pipeline stretching from the Caspian Sea to the Turkish port of Ceyhan as well as the envisaged Nabucco pipeline will be vital for the continued energy supply of EU Member States. Pipelines as well as transport infrastructure in general would furthermore be endangered by any escalations and are also attractive targets for terrorist attacks: in Turkey alone, there were 13 actual or attempted terrorist attacks on oil and gas pipelines between January 2000 and December 2007, many by the PKK and associated groups (MIPT 2007).[2]

1 While the PKK is internationally probably the most widely known insurgent group, it is not the only one and has furthermore renamed itself several times within the past years (see Global Security 2007). It should be clear at this point, that the PKK and similar groups such as the "Kurdistan Freedom Falcons" are considered as terrorists, not only by Turkey but also many members of the international community including the US, the EU and all its Member States (EU 2007).

2 For a more general discussion on energy infrastructure vulnerability to terrorist attacks, see Tänzler et al. 2007.

The Role of Environment

In acute or frozen conflicts, environment and natural resources are no primary driving or triggering factors. But these conflicts have impacted the environment: due to ongoing hostilities, many areas remain essentially unusable for activities such as agriculture and forestry. Closed borders and land degradation further constrain already marginalized areas and local communities. In addition, environment is not a top priority for the countries and entities experiencing conflict, as security and economic development are more pressing concerns. Concurrently, environmental issues such as clean up (e.g. legacies from the Soviet era) have taken a backseat, with a following degradation of the environment. Conflicts have also created incentives for unsustainable activities such as illegal logging. This has on the one hand an eroding effect on state authority by fostering organized crime and corruption, but is also a key source of income. Thus, natural resource availability lower the necessity of conflict parties to come to an agreement as financial and economic pressures for conflict parties are reduced (IA 2004: 131f.). Taking advantage of the low political priority of the environment, several, primarily western donors considered environmental cooperation as a potential entry point for confidence building measures between the conflict parties. The aim of many transboundary environmental cooperation projects was to establish dialogue mechanisms which could facilitate negotiations by supporting a more conducive political climate (see Carius 2006; Ali 2007). Many of these projects, aiming at improving conditions for peace and stability, have been conducted in the South Caucasus. For the protracted conflict over Nagorno-Karabakh, the OSCE conducted a mission to assess the environmental impact of fires in that region upon request by Azerbaijan and Armenia. Through cooperation between the conflict parties forest fires could be better prevented and managed in future.[3]

However, the impact of these activities is mixed. Assessments and evaluations of transboundary environmental efforts and their impact on peace processes are rarely conducted. The reasons for this are many, including a lack of, or unavailability of, assessment methodologies (e.g. lack of indicators) or simply the absence of political will to seriously conduct conflict-sensitive programs and projects. The lack of pre-assessments also makes it difficult to identify whether a specific project would have an impact on peace and conflict. In addition, projects often lack continuous and sufficient funding, are perceived as externally-driven and thus lack ownership. In the worst case, such projects may even create new dividing lines, e.g. if projects clash with the interests of local populations. Concrete effects on the conflicts themselves have not yet been demonstrated.

The conflicts in Turkey's South-East and in the Russian Federation's North Caucasus are different in this regard: due to the nature of the conflicts, environmental cooperation as an instrument for dialogue between conflicting parties does not exist and has not been either initiated nor facilitated by third parties. However, the environmental destruction which occurred as a consequence of the conflict, for instance in Chechnya, remains a key challenge for improving livelihood security.

4.2 / Future Challenges: Environmental Degradation and Climate Change

As has been outlined in Chapter 2, the environmental situation is likely to aggravate due to further environmental degradation and climate change. While 2007 has seen a series of studies focusing on climate change and security (see e.g. CNA 2007; CSIS/CNAS 2007; IA 2007; WBGU 2007), the Black Sea Region has hardly been discussed in detail. However, some conclusions can be drawn from the work of the German Advisory Council on Global Change (WBGU). The WBGU has identified four main conflict constellations, which might emerge through climate change. They are (WBGU 2007: Ch. 6):

(1) **Degradation of freshwater resources** in sufficient quality and quantity, leading to increased competition between different uses such as energy, drinking water, agriculture and others;
(2) **Increase in storm and flood disasters** resulting in heightened vulnerability in particular of coastal and urban areas which is further aggravated by parallel rising sea-levels due among others to thermal expansion;
(3) **A decline in food production** resulting in decreasing food availability, causing food prices to rise, reduced employment opportunities and a drop in agricultural output;
(4) **Environmentally-induced migration** as an indirect consequence of climate change resulting from the constellations described above and from decreasing livelihood security which may cause violence in transit and target regions.

These constellations are not the only threats. Unsustainable development and short-sighted or ineffective governance may also contribute to environmental degradation. For instance, unsustainable land management and inappropriate agricultural policies led to massive famines during times of drought in late 19th century colonial India (Davis 2005). Ill-planned coastal protection significantly raises the threat of extreme weather events, as in the case of Hurricane Katrina in 2005 (Davis 2006). The impact of climate change is thus not a novel issue, but it will severely aggravate existing problems with regards to frequency and scale.

3 In fact, during a debate within the UN General Assembly, the representative of Azerbaijan considered joint operations with Armenia to combat forest fires as important confidence building measures (UN 2006: 26). For more details on the fires, see ECC-Platform, 2006.

None of these constellations is likely to lead directly to violent conflict. Historically, water scarcity for instance has much more often resulted in cooperation than in conflict, even in amidst hostilities (Wolf et al. 2005). Nevertheless they certainly degrade livelihood security and have an eroding effect on socio-economic activity and social resilience by hampering development and increasing vulnerability. Of key relevance in the BSR are the following aspects:

- **Coastal zones:** the development of infrastructure and urban areas in coastal areas creates multiple risks. It increases the number of people concentrated in high-risk areas and makes the economies of BSR littoral states increasingly dependent on these areas. Thus, disasters occurring in coastal areas may not only result in a high number of affected people, but may also significantly impact national economies. This will in turn reduce capacities for adaptation. Environmental destruction resulting from extreme weather events may also strongly impact the tourism sector. Climate change will impact coastal areas in three key ways: firstly through higher than global average sea-level rise; secondly through an estimated increase in storminess; and thirdly, through increased damage of potential disaster events due to sea-level rise.[4]

- **Agriculture:** between 25 and 40% of the gross domestic product (GDP) of Ukraine, Turkey, Georgia and Moldova is generated by agriculture (CIA 2007). Climate change in the form of increased warming (including more frequent and intense heat waves) and decreased precipitations will most strongly affect the southern BSR states, in particular Turkey (IPCC 2007: 875), increasing the risks of prolonged and severe droughts. It will also increase the risk of forest fires and desertification, thus reducing available arable land. Significantly decreased agricultural production is likely to trigger rural-urban migration, thus further exacerbating the problems of coastal areas.

Climate change may thus have strong impacts on key economic sectors of the BSR. The inability to cope with repeating shocks may trap marginalized urban and rural areas in endemic poverty. Repeating shocks may then suffice to unravel the social fabric, resulting in the break-down of communities. While this would be the extreme end of the spectrum of potential consequences, the case of Katrina has shown that even advanced industrialized countries may experience cases of localized state failure in the aftermath of disasters. In addition, competition over scarce resources may, in the absence of adequate mechanism to resolve these issues, increase the likelihood of conflicts within and between communities. Over the long-term, the twin threat of degradation and disaster may reduce the ability of societies to resolve conflicts peacefully and increase incentives for out-of-region migration (see e.g. WBGU 2007: 125f.).

The dimension of the security-relevant consequences of climate change and their negative political, societal and economic impacts will be highly dependent on the extent and effectiveness of adaptation measures. While adaptation will of course require the reallocation of resources, it is nowadays often considered more cost-effective to adapt than to risk the potential negative impacts from climate change.

Regarding the frozen conflicts in the BSR, climate change and environmental degradation will first of all decrease livelihood security. It is unlikely that these impacts will result in heating up the conflicts, or that environment will become a key driver of conflict. Future impacts of climate change may potentially increase the need for cooperation for transboundary environmental cooperation. It is not likely that environment will become a major driver of conflict in Turkey's Southeastern or the Russian Federation's North Caucasus regions either. However, in both cases degrading livelihood security may add to the stresses resulting of (post-) conflict situations and may increase the marginalization particularly of rural communities. To what extent this may actually transform into renewed or fuel existing conflicts is difficult to estimate and needs further scrutiny.

Beyond the regional impacts resulting most likely in lowered social resilience and livelihood security, the BSR will also be affected by climate change impacts in neighbouring regions. The Middle East and Central Asia are both considered potential future hot spots, in particular with regards to water scarcity (see WBGU 2007; Carius et al. forthcoming). It is likely that this may trigger migratory movements into adjacent regions, resulting in further stresses in target or transit regions. Due to the already difficult situations of host populations in a region with a background of protracted conflicts, perceived changes in the demographic make-up of host societies could result in (violent) rejection. In any case, the phenomenon will increase demographic pressures. Thus, climate change has the potential of creating further dividing lines within countries besides the existing conflicts (cf. Clark 2007).

Finally, as outlined in Chapters 2 and 3, the BSR will become increasingly relevant as an energy supply and transport corridor, thus further increasing its geopolitical relevance. Concurrently, extra-regional pressures on Black Sea politics are likely to become more intense; US-based think tanks CSIS and CNAS even contemplated that a deliberate cut-off of (energy) supplies could result in engagement by NATO (CSIS/CNAS 2007: 67). Additionally, it will also make the BSR and particularly its energy infrastructure a more interesting target for terrorist attacks, which may result in significant collateral environmental damage in addition to direct conflicts. Both the region's increasing relevance for energy security and the need to protect critical infrastructure, could lead to a change of priorities, in which not only

4 The IPCC notes in this regard: "In areas of coastal subsidence or high tectonic activity, as in the low tidal range Mediterranean and Black Sea regions, climate-related sea-level rise could significantly increase potential damage from storm surges and tsunamis" (IPCC 2007a: 551, quoting Gregory et al. 2001).

the environment, but also other policy areas such as promotion of democracy, human rights and good governance could take a backseat.

4.3 / Environment and Security: Institutions

While a set of diverse international and regional institutions related to environmental and security affairs operate in the BSR, the number of those working on both issues are limited. In fact, the interagency partnership Environment and Security (ENVSEC) Initiative consisting of the OSCE, UNDP, UNEP, UNECE, NATO and REC has continuously addressed these issues over the past years. In addition, the OSCE has developed under the Spanish presidency an Environmental Security Strategy while the EU has increasingly addressed the inter-linkages between natural resources and conflict. Their activities can be described as follows:

- **ENVSEC:** The aims of ENVSEC are to identify links between human security and the natural environment and to build confidence between states to prevent threats from spilling across (national) boundaries, thus contributing to the management of existing conflicts (Swalley 2007). Within the BSR, ENVSEC is actively engaged in the South Caucasus, Ukraine, Moldova, Bulgaria and Romania. Its activities include fact-finding missions, awareness raising and facilitating public access to information. The key strength of ENVSEC is therefore to provide a platform for communication and networking between actors which is based mainly on mapping exercises. ENVSEC focuses on localized projects and activities or on specific problems affecting countries and sub-regions. Neither the BSR as a whole nor impacts of potential future threats as climate change are currently covered in their assessments. In addition, ENVSEC has only limited resources available. Its demand-driven approach may furthermore lead to "late" identification of potential future hotspot areas given the fact that environment is not a top priority in many countries;

- **OSCE:** The OSCE is actively involved in the resolution of several of the conflicts in the region and has been the main sponsor of ENVSEC. In the Madrid Declaration on Environment and Security of 30 November 2007 it affirmed the necessity and was mandated to work on environment and security. Whether or not concrete activities follow the declaration beyond further support to activities such as ENVSEC's remains to be seen. However, the focus on maritime issues and inland water courses by the Finnish OSCE presidency provides ample opportunity to discuss potential threats arising from sea-level rise, potential storm surges and water scarcity. Beyond this, a key advantage of the OSCE remains its regional scope: not only does it include all BSR states, but also all EU member states plus the US, bringing all major regional geopolitical actors at one table. At the same time, this is also a significant disadvantage, as it makes decision-making procedures cumbersome;

- **EU:** Within the framework of the ENP, the Pre-Accession process and in general EU policies towards the BSR, environment has long taken a backseat in favour of other topics such as energy and economic development. One of the recent communications of the EU Commission has highlighted the importance of adaptation to climate change, but its effects remains to be seen (EC 2007). On environment and security, the ENP has so far been largely silent despite its clear focus on stability and security. The EU Commission has however begun to step up its activities regarding environment and security *in general*. In particular, in parallel and following an evaluation of the Commission's external policy towards inter-linkages between natural resources and conflict (Carius et al. 2007), a number of institutional changes have been initiated. This includes the establishment of the Instrument for Stability to finance measures preventing and managing crisis and their consequences outside the EU, which will have a special facility on natural resources and conflict; the establishment of the Peacebuilding Partnership which in essence is a network of (European) experts and organizations working in the field of peace and security and which will likely create a subgroup on natural resource management and conflict; and the funding of the Initiative for Peacebuilding (IfP) which also works on natural resources and peace and conflict issues. Beyond this, the Council Secretariat and the Commission have been requested by the Council in the conclusions of the German Presidency 2007 to provide a joint paper on climate change and security for discussion at the Spring Council in 2008. While all these activities only focus on the BSR to a certain degree, the EU becomes increasingly able to actively work on inter-linkages between environmental factors and conflict.

Beyond the organisations working on environment and security, there are a number of regional organisations and initiatives which may foster regional dialogue and exchange, thereby reducing bilateral tensions. These include the Black Sea Commission or the Organization of the Black Sea Economic Cooperation (BSEC) (see Chapter 5). One of the key aspects of these organizations is that they allow for a more comprehensive regional approach, as they also have non-littoral states as members. While these organizations do not have a mandate to engage in security issues, they can provide valuable support to conflict prevention by working towards sustainable and resilient development and thus preventing environmental factors from inducing conflicts. Subsuming this under the "security umbrella", however, is unnecessary and is most likely to be counterproductive in these forums due to the political sensitivity of security issues.

4.4 / The Black Sea, Environment and Security: Options for Actions. Conclusions and recommendations

In summary, the environment is currently not a key driver for either violent conflicts or peace processes in the Black Sea. Nor is it a key concern from the point of view of national or regional security. Instead, environmental degradation mainly results in livelihood insecurity and in hampering economic development, which is further aggravated by the environmental impacts following conflict.

This constellation is likely to be significantly aggravated by the current parallel trends of increased environmental degradation and the likely impacts of climate change. If left unaddressed, it may not only further hamper development and poverty eradication, but also weaken societal resilience and result in presumably mostly localized breakdowns of public order. Thus environmental degradation may in the future become a relevant background factor for conflicts and instability, albeit indirectly. In addition, further stresses from outside the region will increasingly impact on the Black Sea states, in particular due to its relevance for energy security. Preventing or at least mitigating these effects means primarily to focus more strongly on sustainable *and* resilient development, as has been argued elsewhere in this report. This needs to be done in a conflict-sensitive way as it will take place in conflictual and fragile settings. Maladaptation, in particular, needs to be avoided. With a view to linkages between environment, peace, security and development, there is currently still a knowledge gap with regards to future challenges such as climate change (see WBGU 2007: 193f.).

With the OSCE also increasingly becoming an actor in the area of environment and security, enhanced cooperation between the EU and OSCE becomes of utmost importance to harness synergy effects. While of course all conflicts mentioned above are unique in their own right and require tailored action, the EU and its member states could improve the foundation for such action through the following activities:

(1) Develop an analysis on the impacts of climate change on the BSR security situation including immediately adjacent regions; security should thereby be defined broadly to capture threats on livelihood security;
(2) Promote climate change adaptation and mitigation measures with focus on very concrete projects at a local level aiming to improve the livelihood situation. Additionally, the support for policy development on national level is highly relevant as enabling condition for projects;
(3) Develop and implement suitable methods and instruments to conduct conflict-sensitive adaptation measures;
(4) Make conflict-sensitive programming (including adequate training and staffing) a prerequisite for projects in areas suffering from either acute or frozen conflicts;
(5) Draw on the expertise of the Peacebuilding Partnership, the IfP and ENVSEC to identify potential environmental triggers for future political crises in the BSR;
(6) Identify existing environment-related trans-regional migratory movements and how climate change and environment may affect them or create new ones (including adjacent regions). This needs to incorporate an analysis on how migrants and host communities are currently cooperating and competing over resources;
(7) Engage with different societal actors in conflict regions on environmental topics to build confidence and provide funds for civil society activities in environment and conflict resolution;
(8) Conduct environmental assessments and monitoring activities in frozen conflict regions drawing on the experience of civil society actors;
(9) The EU Commission should become an Observer partner of ENVSEC and share best practices and lessons learnt in the areas of natural resources, conflict management and peacebuilding. In addition, it should aim at harmonizing approaches between ENVSEC members including the organization of joint trainings and assessment missions;
(10) EU member states should work towards integrating environment and security during the Finnish OSCE presidency with its main focus on maritime affairs and inland water courses;
(11) The EU should actively use the potential of regional organizations such as BSEC and the Black Sea commission to further dialogue and deepen cooperation on environment and security issues.

Chapter 5 / THE BLACK SEA INSTITUTIONS

5.1 / Introduction

The institutional structure for regional cooperation among the Black Sea littoral states is still quite new, dating only to the collapse of the Soviet Union in 1991. Except for Turkey, all of the other littoral states have had to build national political systems and transform their economies into modern market-based systems. Given these very recent and enormous changes, which are still under way in some countries, it is understandable that the effort to build effective regional cooperation to protect and conserve the Black Sea and its resources is a work still very much in progress.

With the 2007 Enlargement that brought Bulgaria and Romania into the European Union, the Black Sea has also become an "EU sea". This chapter reviews the various institutions in place for regional cooperation around the Black Sea, as well as the EU position vis-à-vis the Black Sea and other relevant fora for regional cooperation with respect to other sea basin areas, including the Northern Dimension and the Euro-Mediterranean Partnership. It concludes with some suggestions for measures that the EU and its Black Sea neighbours might consider adopting, with a view to strengthening the institutional framework for Black Sea cooperation and for "greening" EU policies in this strategically important region.

5.2 / The EU position *vis-à-vis* the Black Sea

From an environmental perspective, one of the main drivers in the Community's involvement in the Black Sea Region today is the Thematic Strategy on the Protection and Conservation of the Marine Environment, which constitutes the environmental pillar of the Maritime Policy. These instruments have delineated the EU's growing interest and role in marine issues. The EU's aim is to achieve good environmental status of the EU's marine waters and to protect the resource base upon which economic and social activities depend.[1] The Strategy pays special attention to cooperation with regional structures.

One element of the Strategy is the proposed Marine Strategy Directive, which will designate European Marine Regions on the basis of geographical and environmental criteria. Each member state will be required to ensure that its waters reach or remain in "good environmental status" by 2020 at the latest.[2] In its current redaction, the draft Directive refers to four Marine Regions including the Black Sea.[3] It calls for cooperation and consultation with all interested parties, including Regional Sea Conventions. The European Parliament and Council reached agreement on the proposed Directive in December 2007 and the formal legal text will likely be published in mid 2008.

The Black Sea Synergy adds a regional dimension to the European Neighbourhood Policy to its pre-accession policy and to its partnership with Russia by recognizing the need for an increased European Union involvement in the Black Sea area. It involves reinforcing existing initiatives for the development of cooperation both within the region as a whole and between the region and the EU. In relation to environmental aspects, the Synergy makes specific reference to the Bucharest Convention[4] and considers the Community's accession to the Convention a priority. It also recognizes the need for better implementation of multilateral environmental agreements in the region and a possible extension of the DABLAS Task Force's approach, as well as regional-level activities to combat climate change.

The development of a regional approach is complicated by the fact that Black Sea Basin countries have varying status vis-à-vis the EU. Greece, Romania and Bulgaria are member states and Turkey is a pre-accession country while Moldova, Ukraine, Georgia, Armenia and Azerbaijan are covered by the European Neighbourhood Policy. Finally, the EU-Russian relationship is based on a Partnership and Cooperation Agreement, which is also the framework for the four Common Spaces of cooperation and their associated Road-Maps. In addition, the Black Sea Synergy foresees the possibility to extend its scope beyond these countries to neighbouring regions, in particular the Caspian Sea, Central Asia and South-Eastern Europe. These countries fall respectively under the Central Asia Regional Strategy and the Stabilization and Association process in the Western Balkans.

In the Black Sea Synergy policy documents, the EU has proposed to focus on existing cooperation structures. A review of the institutional context and associated structures currently in place, along with other EU and international initiatives in the region, and the analysis of key EU initiatives in other regions, shows significant potential for an increased and effective involvement of the EU in addressing the environmental concerns of the region.

1 Communication from the Commission to the Council and the European Parliament 'Thematic Strategy on the Protection and Conservation of the Marine Environment', SEC(2005)1290. The Strategy will be reviewed in 2010.

2 Proposal for a Directive of the European Parliament and of the Council establishing A Framework for Community Action in the Field of Marine Environmental Policy (Marine Strategy Directive), revised draft reflecting the political agreement reached by the Council (Environment) on 18 December 2006.

3 Common position adopted by the Council with a view to the adoption of a Directive of the European Parliament and of the Council establishing a Framework for Community Action in the field of Marine Environmental Policy (Marine Strategy Framework Directive), 12/07/2007

4 The Black Sea Synergy states that 'Community accession to the Convention on the Protection of the Black Sea against Pollution is a priority.'

5.3 / Institutional Context

Several regional organizations and initiatives are currently active in the region, reflecting the need and political will for cooperation and coordination in the area. These organizations and initiatives differ greatly in terms of geographical scope, extent and focus of cooperation activities.

Structures/Initiatives	Countries Involved	EU Status
Black Sea Synergy	Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Turkey, Ukraine	Initiator
Bucharest Convention	Bulgaria, Georgia, Russia, Romania, Turkey, Ukraine	Observer
Black Sea Economic Cooperation Initiative	Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Serbia, Turkey, Ukraine	Observer
Black Sea Forum for Dialogue and Partnership	Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Turkey, Ukraine	Partner
Organisation for Democracy and Economic Development - GUAM	Azerbaijan, Georgia, Moldova, Ukraine	-
The Community of Democratic Choice	Estonia, Georgia, Latvia, Lithuania, Macedonia, Moldova, Romania, Slovenia, Ukraine	-

As described below, most of these structures are not living up to their ambitions and their activities are often limited by the lack of political commitments at both regional and national levels.

The Black Sea Convention

The main cooperation structure in the region is the Black Sea Commission created in September 2000 under the 1992 Bucharest Convention. Its Permanent Secretariat, based in Istanbul, has only two persons supported by two support staff.

Various international organizations and donors have supported the work of the Bucharest Convention over the years. In particular, the assistance of the Global Environmental Facility (GEF) has been crucial. Starting in 1993, the GEF has supported the Black Sea Environmental Programme (BSEP), followed by the Black Sea Ecosystem Recovery Project (BSERP), set up under the Strategic Partnership for the Black Sea and Danube Basin with UNDP, the World Bank, the EU and other partners. Under the BSEP, a series of studies were developed leading to a Transboundary Diagnostic Analysis finalized in 1996, and the Black Sea Strategic Action Plan. National Strategic Action Plans were then developed in the period 1997-1999. Part of the institutional structure set up under the BSEP (6 Activity Centers distributed among the littoral states and 7 Advisory Groups) is today viewed as not having been very effective in bringing about policy changes.

The end of BSERP second phase in late 2007 will see a significant disengagement of the GEF from the Black Sea, leaving the Black Sea Commission with very limited financial resources. Other international partners have also scaled down their contributions, in the hope that the Parties to the Convention would come forward with the political and financial support needed for strong regional cooperation. This effort to make the Black Sea Commission and its Secretariat more self-sustaining has had only limited success. Very few Activity Centers are functioning, due to lack of funding, and Advisory Group activities are often unfocused and do not feed into political decision-making.

The Black Sea Commission has recognized the need to revise this institutional setting. There is a general agreement on the necessity to amend the outdated Black Sea Convention in order to integrate best practices and open the Convention to accession by regional organizations such as the EU. However, the Black Sea Commission has had a tendency to inertia, and lack of political will impedes efficient both decision-making and increased regional cooperation. It would be essential to ensure that all key partners are willing to amend the Convention. Nevertheless it is not clear yet whether the next Black Sea Ministerial Conference, to be held in Kiev in June 2008, will adopt such amendments or will only decide on future preparatory activities.

All this explains the difficulties encountered in developing additional legal instruments under the Convention. The Protocol on biodiversity and landscape conservation, adopted in 2002, is not yet in force, having been ratified by only two countries – Turkey and Ukraine. Several draft protocols and legal documents[5] have been developed but the adoption process is constantly delayed.

Despite these problems, the Bucharest Convention remains a key mechanism for cooperation within the region. As a regional sea convention, it is the only legal structure responsible for protecting the Black Sea environment and remains the main instrument for regional cooperation in areas such as environment and fisheries. If the EU is to play a full role in this structure, it is essential that it should join the Convention. A condition *sine qua non* for this is the adoption of the necessary legal basis for the EU, as a regional economic integration organization, to accede to the Convention. Amendments to the Convention should be formally adopted before the EU can become a Party.

5 These are a draft Strategic Action Plan for the Biodiversity Protocol, a draft Integrated Coastal Zone Management Strategy and Action Plan, a draft legally binding Document for Fisheries and Conservation of Living Resources of the Black Sea, and a draft Revised Protocol for the Protection of the Black Sea against Pollution from Land-Based Sources and Activities

Other Regional Cooperation Structures

The Black Sea Economic Cooperation (BSEC), set up in 1992, became an economic regional organization in 1999. BSEC has established different institutions, in particular a Parliamentary Assembly, a Permanent Secretariat, the Black Sea Trade and Development Bank and a Project Development Fund. In the field of environment protection, the BSEC Joint Declaration and Action Plan call, among others, for regional cooperation and harmonization of environmental legislation taking into account the legislative framework of the EU, but include little concrete activities. The focus of its activities remains the development of economic relations between its members, and few practical cooperation projects have emerged even in this area.

The Black Sea Forum for Dialogue and Partnership, launched in June 2006, has been designed as a regular consultative process among countries of the extended Black Sea Region and between this group of countries and international organizations. It has no permanent structure. Its viability is under question mainly due to Russia's reluctance to participate.

Dormant since its establishment in 1997, the Organization for Democracy and Economic Development – linking Georgia, Ukraine, Azerbaijan and Moldova and therefore known as GUAM – was revitalized in 2006. It now has a formalized structure and redefined objectives focusing on the development of free trade and democratic values along the Caspian-Caucasus-Black Sea area. The GUAM Sectoral Cooperation Development Strategy,[6] adopted at the Baku summit, sets up the objectives, tasks and forms of cooperation in economic and trade relations, energy, transport, IT, the fight against terrorism and prevention and response to emergency situations, as well as culture, science and education, along tourism.

At the 10th anniversary celebration, GUAM members stated that they saw themselves as a natural partner of the EU and considered EU-GUAM, Nordic-Baltic countries – GUAM cooperation as the most promising areas for partnership. In addition, the four member countries have recognized that environment should become one of the priority areas of their activities. It remains to be seen if the parties to the ODED – GUAM will succeed in their attempt to concretize their commitments for reinforced cooperation. The same remark applies to a later initiative, the Community of Democratic Choice (CDC), set up at the initiative of Georgia and Ukraine, with a larger membership and focus on the Baltic-Black Sea Region. The CDC aims at promoting democracy, human rights, and cooperative efforts to end regional conflicts.

5.4 / EU and International Initiatives and funding available for the Black Sea

The European Neighbourhood Policy and Associated Funding[7]

The European Neighbourhood Policy (ENP) is a different approach than the more traditional framework for bilateral cooperation, which has until now characterized the EU's dealings with the countries of the region.

Under the European Neighbourhood and Partnership Instrument (ENPI), 73% of the funds are allocated to country programs. There is no specific financing line allocated to the Black Sea, as defined by the Communication on the Black Sea Synergy, except for the Black Sea CBC program. The amount allocated to it is very limited: 17 million, compared with €173.6 million available for the Mediterranean.

The ENPI also includes an Eastern dimension, the ENPI-East. 25 to 35% of available funds are to be allocated to environmental issues. However, the only action provided for in this field in the Annual Action Program for ENPI-East for 2007 relates to the improvement of Forestry Law and Governance (€6 million out of a total budget of €56 million).[8]

Therefore, little funds are allocated to the Black Sea Region as such. In certain areas such as biodiversity, wetlands protection, funding is decreasing. The only program that foresees direct activities on biodiversity and nature conservation is the Thematic program environment and natural resources including energy ENRTP with about 7 million euros over a period of 7 years, and this will support activities both in the East and South.

The low return of EC funded projects is a subject of concern among the civil society. This would call for external assessment of the efficiency of EC funded projects, but also the way civil society is involved in these.

Other EU initiatives on environment

The EU Water Initiative (EUWI), launched at the 2002 Johannesburg Summit for Sustainable Development, seeks to meet the Millennium Development Goals for drinking water and sanitation globally. The EUWI is a multi-stakeholder platform that aims to strengthen coordination and identify additional financial resources and mechanisms to ensure sustainable financing in the water sector. The chair currently held by the Commission will pass on to Romania in 2008. The EUWI-EECCA component focuses on improving the management of water resources through two

6 http://www.guam.org.ua/275.811.0.0.1.0.phtml
7 For more detail, see Appendix B.
8 It should be noted that several water related projects still financed under TACIS remaining budget are on-going or about to start in the region.

thematic pillars: water supply and sanitation and integrated water resources management (IWRM).

The EAP Task Force[9] under the Environment for Europe (EfE) process and the United Nations Economic Commission for Europe (UNECE) play a key role in the development and implementation of the EUWI-EECCA and in particular of National Policy Dialogues on water supply and sanitation, financing and IWRM (NPDs).[10] The EUWI-EECCA focuses on national level and internal waters issues rather than regional seas as such. Therefore, although some activities are relevant especially in relation to the implementation of the Bucharest Convention at the national level (pollution from rivers and land-based sources), the EUWI-EECCA added value is to cover other areas and issues of concern in the region at large, and therefore can be a complementary tool to promote environmental cooperation in relation to the Black Sea. The main problem is that the EUWI-EECCA suffers from a lack of visibility and has not been very successful in involving other donors and IFIs. The Commission has itself recognized that the Initiative 'has not so far produced the expected results.'[11]

The most useful coordination structure in terms of results achieved (i.e., pollution reduction) has been the DABLAS Task Force, set up in 2001. It has enabled IFIs donors and beneficiaries to cooperate on water-related investment projects for both the Danube and the Black Sea Area. On the whole, some of the most important factors for success of the DABLAS process have been the facts that (i) project preparation funds were available to encourage upgrading of projects in a phased approach[12] and that (ii) there was a clear focus on municipal water investment as the most bankable projects. In addition, the World Bank supported nutrient reduction projects.

The EU is supporting Regional Environmental Centres in most of the BS countries. The idea of establishing regional environmental centres in the countries of the former Soviet Union emerged during the early Environment for Europe process and was formally endorsed in 1996 by European environment ministers at the Sofia Conference. The Hungary-based REC for Central and Eastern Europe (CEE) was the initial model for the Eastern European and Central Asian RECs, which were set up with the aim to assisting in solving environmental problems in the region through the promotion of cooperation between various stakeholders, assistance to environmental NGOs and increasing public participation in the decision-making process, with an emphasis on the development of democratic civil society in the EECCA countries. The EC started to support RECs through financial funding in 2000.

In some countries, such as Russia, the RECs have played an important role in facilitating the dialogue between the national authorities and the civil society. In specific cases, such as in the Caucasus, the work of the REC was made particularly difficult due to political tensions. Generally RECs can play a useful role during transitional periods while there is a lack of consultation mechanism and policy capacity both in the side of the civil society and the government. Nowadays, as there is increased policy capacity and awareness in the Black Sea Region countries, regional and local NGOs have expressed concern about the potential overlap with their own activities leading to competition for scarce resources.

Additional International Initiatives

Other international financial institutions and donors are active in the region. Apart from GEF mentioned above, international support and activities, bilateral cooperation is pursued by several countries e.g. Austria, UK, Germany. The Black Sea basin countries are parties to various relevant UNECE multilateral environmental agreements (MEA)[13] and the UNECE and other UN agencies and programs have been involved in the region. However, certain Black Sea countries did not ratify some key MEA and the level of implementation is often low.

In particular, the Environment for Europe (EfE) process has been a key political forum to promote cooperation in the UNECE region. However, the Belgrade Ministerial Conference has decided to reform the EfE process and therefore, before the reform plan is endorsed by the UNECE session in 2009, EfE future remains uncertain. The EU has clearly indicated[14] that its involvement will remain limited and mainly focus on participating in the implementation of UNECE environmental conventions, contributing to UNECE Environmental Performance Reviews, facilitating and supporting the network of EECCA Regional Environmental Centers, participating in selected sub-regional initiatives, in particular in relation to Central Asia, and contributing to improvement of the water sector in the region towards the objectives of the EUWI.

9 The EAP Task Force was set up by the 1993 'Environment for Europe' Ministerial Conference in order to facilitate the implementation of the Environmental Action Programme for Eastern Europe, Caucasus and Central Asia countries adopted by this Conference.

10 The NPDs aim at implementing comprehensive policy packages including legislation and standards. NPDs have started in both Moldova and Armenia, while it should start in Ukraine and Kyrgyzstan respectively beginning and mid-2008.

11 Commission Non-Paper 'ENP – Thematic Dimension', COM(2006) 726 final

12 DABLAS is following a phased approach as potential investment projects are classified in a priority project pipeline under four categories from pre-feasibility stage to nearly approved or approved financing for investments contributing to improvements in waste water. Overtime, investment projects move up through the pipeline, from one category to another, before being approved for funding.

13 These include the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991) and its Protocol on Strategic Environmental Assessment (Kiev, 2003), the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus, 1998)

14 See Communication from the Commission to the Council and the European Parliament *'Commission cooperation with the Environment for Europe Process after the 2007 Ministerial Conference in Belgrade'*, COM(2007)262 final

Finally, the Council of Europe and the Organization for Security and Cooperation in Europe (OSCE) play a key role in monitoring the implementation of human rights, democracy and the rule of law. The Council of Europe is active in fostering cooperation between regional authorities within the framework of the newly set Black Sea euro-region. The Euro-Regions are mainly used as a framework for fostering cross-border contacts and regional/local cooperation.

5.5 / The way forward: Are the Euro-Mediterranean Partnership and the Northern Dimension potential models for the EU policy in the Black Sea Region?

The Northern Dimension policy and the Euro-Mediterranean Partnership (Barcelona Process), with its specific initiative on the environment (Horizon 2020), have been considered potential models of coordination within regional sea areas. Although it is not appropriate to strive to simply reproduce these two initiatives in a region, which is far less advanced in terms of regional cooperation and present specific features, they can provide some useful benchmarks for the development of the EU policy in the Black Sea Region.

The Northern Dimension

The Northern Dimension policy was established in 1999, with the broad objective to provide a common framework for the promotion of dialogue and concrete cooperation, strengthening stability, wellbeing and sustainable development in Northern Europe. The Northern Dimension partners are the EU member states, the EU Commission, Norway, Iceland and Russia, together with different regional cooperation structures, namely the Council of the Baltic Sea States, the Barents Euro-Artic Council, the Nordic Council of Ministers and the Artic Council.

It is only in 2006 that the adoption of the Political Declaration on the Northern Dimension Policy and the associated Policy Framework Document[15] provided a permanent foundation to this policy, involving ministerial meetings and a steering group. The policy is characterized as the regional expression in the North of the EU/Russia Common Spaces. This reflects one of the most striking achievements of the Northern Dimension in that it succeeds in involving Russia in concrete cooperation projects, on a non-political basis. The main implementation instrument is the Partnership model, inspired by the Northern Dimension Environmental Partnership (NDEP), often considered as a key result of the Northern Dimension.[16] This should be extended to other areas including energy and transport. Such a structure could constitute an interesting precedent for the Black Sea Region, in particular, the NDEP Fund which attracts funding not only from the Commission but also from individual countries, including EU member states, Norway and, more importantly, Russia. The Fund is managed by the European Bank for Reconstruction and Development (EBRD) and the Steering Group is composed of EBRD, the European Investment Bank (EIB) and the Nordic Investment Bank (NIB). It addresses nuclear safety and general environmental concerns.

The EU-Russia Environmental Dialogue between DG Environment and the Russian Ministry of Natural Resources, launched by the EU-Russia Permanent Partnership Council (PPC) on Environment, has led to the setting up of subgroups on particular areas of importance to the Northern Dimension such as water and the marine environment, climate change or governance and conservation. These could constitute relevant fora to discuss environmental concerns specific to the Black Sea Region.

Other features of the Northern Dimension, which could be relevant for the Black Sea Region, are:

- the Northern Dimension Information System, which provides information on projects in the area, facilitating exchange between stakeholders and enhancing the visibility of the Northern Dimension policy;
- the Commission Inter-Service Group on the Northern Dimension and the Artic, which includes officials from several DG and is chaired by DG RELEX.

It should be underlined that the Northern Dimension is linked to active cooperation structures e.g. the Baltic Council, and strongly driven by Northern States. There is no such driving political force in the Black Sea Region at this point. Besides, the Black Sea Region is much more complex and diversified than the Northern area which is more homogenous and does not suffer from the bilateral tensions existing in the Black Sea area. Therefore, while the pragmatic and gradual approach undertaken under the Northern Dimension is exemplary, it may take more time to reach such results in the Black Sea Region, involving all the interested partners i.e. not only the Black Sea countries but also existing cooperation structures, such as BSEC.

The Barcelona Process and Horizon 2020

UNEP launched its first regional seas effort in 1975, with respect to the *Mediterranean Action Plan* (MAP). The 1976 Barcelona Convention and its protocols have provided a common legal framework for protecting the sea's environment. However, for many years the MAP focused primarily on monitoring and information sharing, whereas financing

15 The new Northern Dimension policy adopted on 24 November 2006 in Helsinki entered into force on 1 January 2007
16 *Models for the European Neighbourhood Policy: The European Economic Area and the Northern Dimension*, Marius Vahl, CEPS Working Document, February 2005

mechanisms for investment in environmental infrastructure were not established until very recently.
The Euro-Mediterranean Partnership and what is known as the Barcelona Process, launched in 1995, is the main framework for multilateral dialogue and cooperation between the EU member states and Southern Mediterranean countries. In November 2006 in Cairo, the partners endorsed a timetable to reduce the pollution in the Mediterranean by identifying and acting on major sources by 2020, thus launching the Horizon 2020 initiative. This initiative includes work in four main areas, the first of which is the investment for pollution reduction projects for priority sectors (urban waste water, municipal waste and industrial emissions). This will involve the development of pollution reduction projects addressing these priority sectors defined in the Euro-Mediterranean process. The other areas are: capacity building measures, research and monitoring, steering, and review.

Horizon 2020 seeks to establish collaboration between the European Commission, EU member states, IFIs, southern Mediterranean partners, and other stakeholders including NGOs. Coordination between Horizon 2020 and the parallel Strategic Partnership for the Mediterranean Large Marine Ecosystem[17] represents also a key challenge and it remains to be seen how successful the EU will be in promoting collaboration between the main stakeholders in the context of Horizon 2020.

The Horizon 2020 focus on hot spots is an effective approach. In the Black Sea Region, this could be initiated through DABLAS, rather than be established as an additional initiative. Coordination should be ensured with the work pursued under the latest Transboundary Diagnostic Analysis (TDA) carried out under the BSERP project and the future associated Strategic Action Plan, which should be adopted at the next Black Sea Ministerial Conference in June 2008.

Other key aspects of the Barcelona process that could be used as potential models are:

- the institutionalization of multilateral cooperation at high-level. A Euromed Ministerial Meeting at Ministers of Foreign Affairs level meets every 12 to 18 moths to assess overall implementation and to provide political guidance. In parallel, regional thematic processes ensure institutional contacts and cooperation in areas such as environment, energy or water management;
- the focus on stakeholders exchange at regional level: numerous fora and platforms have been set up to promote communication and exchange between various stakeholders, including NGOs, academia, civil society and regional/local authorities, in the region. A NGO Platform involving representatives from the environment, human rights, gender and cultural NGOs is supported by the EU;
- The dissemination of information in the area of environment and freshwater via information systems supported by EU funds. Most relevant are the Euro-Mediterranean Water Information System, EMWIS, and the regional support structure set up in the context of the Short and Medium Term Action Programme on Environment, SMAP.

Finally, the EU has been active in the Mediterranean region for the last 15 years and Southern member states have a long tradition of cooperation with some partner countries. Whilst the Barcelona Process has partially succeeded in enhancing regional relations in specific areas (e.g. environment, energy), it has not been very successful in terms of democratization and human rights. In contrast, the EU is only starting to get involved into the Black Sea Region. Apart from Romania and Bulgaria, and to a lesser extent Turkey, there are not such strong historical relations between the EU Member States and the other Black Sea countries.

5.6 / What should be the role of the EU and the BS countries in increasing the strategic and institutional development in the area of environment? Conclusions and recommendations

In line with the principle set up in the ENP Thematic Dimension, EU involvement in the Black Sea Region should build on existing structures rather than creating new ones. The necessity to engage Russia, which is a key strategic player in the region, is also a crucial factor. Although Russia is not covered by the ENP, its integration in the Black Sea Synergy is a means to prevent that Russia and other non-ENP countries in the area, such as Turkey, are not excluded from regional activities on the environment.

Recommendation: EU to join the Bucharest Convention and foster cooperation within the Black Sea Commission

Notwithstanding its downfalls, namely a weak and partially inadequate legal and institutional framework, a lack of political commitment from its members, scarce financial resources and a membership limited to littoral countries, the Bucharest Convention remains the most suitable structure to improve cooperation on environmental issues on a regional basis.

Accession to the Bucharest Convention is therefore a priority for the EU. Once a Party to the Black Sea Convention, the EU will be able to play a driving role in improving the current institutional structure and the Convention legal

17 The Strategic Partnership for the Mediterranean Large Marine Ecosystem links UNEP and the World Bank. It will have two main elements: a regional component and a Partnership Investment Fund for the Mediterranean Sea Large Marine Ecosystem (World Bank)

framework as well as fostering cooperation, including on environmental aspects linked to transport and energy e.g. integrated coastal zone management activities, marine safety, response to emergency situations, biodiversity, etc. The EU involvement should be reinforced through strengthening the current European Environment Agency (EEA) collaboration with the Black Sea Permanent Secretariat, accompanied (when adequate) by a participation of the Black Sea countries in the EEA activities at a bilateral level. The EU could be also a driving force in involving other Black Sea basin countries in the activities of the Black Sea Convention, in particular those countries covered by the Black Sea Synergy but not parties to the Convention.
The EU as a Party to the Convention will also be in a better position to provide significant support to the Black Sea Commission and its Permanent Secretariat, e.g., by seconding an EU expert to the Permanent Secretariat to provide ongoing support.

Recommendation: All Black Sea countries to be involved in the implementation of the EU Marine Strategy Directive

The Bucharest Convention has also a key role to play in the implementation of the EU Marine Strategy and meeting the objective of a 'good environmental status' of the Black Sea waters, as recognised by the Synergy itself, which calls for cooperation with the relevant regional sea conventions.

The EU Marine Directive provides a "framework for member states to take the necessary measures to achieve or maintain good environmental status in the marine environment by 2020 at the latest" (Article 1(1)). This concerns not only EU member states' waters (Article 2(1) but also regional waters, in particular the Black Sea (Article 4(1)(d)).

The inclusion of the Black Sea in the Marine Strategy Directive which is a component of the EU's maritime policy is designed to combat its environmental degradation. Not only will the EU member states need to take action but it will require regional cooperation with third countries to meet the targets and objectives laid down in the legislation (Article 6). Concrete action needs to be taken.

Recommendation: EU to participate more actively in broader organizations and initiatives

Accession to the Bucharest Convention should be complemented by a more active participation in broader initiatives such as BSEC. The BSEC has the distinctive advantage of a membership extending to all countries of the region. The institutional structures in place constitute a promising framework for enhanced dialogue and cooperation. However, at this stage, BSEC limited influence in the region makes it more a forum for an enhanced dialogue than for concrete cooperation. Such cooperation should be restricted to participation in specific projects carried out under BSEC and could be developed at inter-governmental level, but also through private sector/NGO and public sector cooperation. This participation into concrete projects could lead to an evolution of the Black Sea Synergy towards a cooperation framework similar to the Northern Dimension or the Euromed Partnership.

Other regional initiatives offer less perspective for future cooperation. For example, the Black Sea Forum does not seem to be viable on the long term. As the ODED-GUAM and the CDC, it does not involve Russia, which needs to be a key partner in regional cooperation. However, all these regional cooperation structures should play a central role in helping countries to share experience and lessons and finding new sources of funding, as well as coordinating ongoing donors and IFIs actions. Such structures could act as a driver to build peer pressure for actions.

Recommendation: Bulgaria and Romania to provide political impetus for improved cooperation in the region

Much depends on the driving political role that Romania or Bulgaria could play, in their combined roles as Black Sea littoral countries and EU Member States. During its Presidency of BSEC, Romania has sought to improve the institutional setting of BSEC and initiated the adoption of a Joint Declaration and Action Plan on environmental protection. On the other hand, the Black Sea Forum Initiative was driven by Romania as an attempt to overcome the limited scope of cooperation within BSEC.[18] As explained above, this initiative did not bring a significant impetus to the cooperation in the region.

However, both countries are to play a central role in the Black Sea cooperation structures and initiatives. In particular, Bulgaria can push forward the EU agenda, as it will hold the chairmanship of the Black Sea Commission after Ukraine. In addition, Romania will take the lead of the EU-WI-EECCA in 2008 and will be in a position to promote the Black Sea Region within the EU and among other international partners, although, in this latter case, it will be more focused on national level improvements in water governance. Both countries, as new member states still very much in transition, will need strong support from the EU in developing a leading role in the regional cooperation process.

Recommendation: EU to provide overall political guidance in the framework of the Black Sea Synergy

The Commission has proposed to develop in the European Neighbourhood dialogue and cooperation on thematic is-

18 *The Wider Black Sea Region: An Emerging Hub in European Security*, Svante Cornell, Anna Jonsson, Niklas Nilsson, Per Häggström, Central Asia-Caucasus Institute & Silk Road Studies Program, 2006.

sues, including energy, transport and the environment. It is essential that these thematic components be not addressed in isolation. This is equally true with regard to broader cooperation framework such as the Baku Initiative on energy and transport, which shall also integrate environmental aspects. Overall political guidance should be provided in the framework of the Black Sea Synergy to streamline environmental concerns into these other cooperation fields. At present, the regional approach of the EU under the ENP is scattered among different strategies, programs and dimensions (CBC, the thematic dimension, the ENPI-East). Although these reflect at least partially the new role of the EU in the region, they do not constitute a clear and comprehensive EU policy. The promotion of the Black Sea Synergy as the main framework for EU activities in the region will give more visibility and political value to the involvement of the EU in the Black Sea area.

Recommendation: EU to reinforce coordination, in particular internally

By becoming more involved in regional activities, the EU is in a unique position to foster regional integration. However, strong linkages should be established as a priority within the EU's own institutional structures and activities through:

- Inter-General Directorates coordination along the line of the Commission Inter-Service group created under the Northern Dimension;
- Coordination between various bilateral and regional assistance projects funded by the EU, with the involvement of the EU delegations;
- Supporting cooperation between different regional seas structures (HELCOM, OSPAR, MAP) and facilitating peer exchanges internally, but also externally.

Recommendation: EU, Black Sea countries and other organizations active in the region to promote NGO involvement

Developing the policy and monitoring role of NGOs is essential in building a strong regional identity. The promotion of the involvement of NGOs and the civil society in general as a partner (e.g. through NGO platforms at national and regional level, information systems or NGO thematic forums, such as on the environment) was one of the main requests expressed notably by Black Sea NGOs meeting in Odessa in February 2008 (see Appendix I).

In order to foster such involvement, it is important that local NGOs participate in and receive reliable information on the relevant programs, projects and activities as well as on the existing funding opportunities. Grant application procedures are often too complex and costly for small NGOs. This is particularly true in relation to programs and projects financed under the Black Sea CBC programme which, on the other hand, raises expectations in relation to environmental cooperation at local level and people to people cooperation. Ways of simplifying the procedures should be investigated, and information on alternative (and more accessible) sources of funding (e.g. foundations) should be made available. More small-scale and flexible support should be provided that can be accessed by local communities and NGOs, e.g. by providing the funds to intermediary organizations for re-granting. At the same time, a better organization at local level, in particular, a more active role of local authorities, universities and chambers of commerce, in guiding and supporting local NGOs would also contribute to enhancing their involvement.

Recommendation: EU to promote concrete projects at the regional level, and small-scale projects, through ENPI and its leading role in the DABLAS Task Force & DABLAS Task Force process to be extended in other areas

The ENPI and the Neighbourhood Investment Facility will be the main vehicles for providing EU support for Black Sea cooperation. The policy documents developed by the Commission in the context of the strengthening of the ENP offer several interesting perspectives. However, this should be concretised through specific and targeted regional projects like emergency preparedness measures that would need institutional structures for coordinating national-level actions.

Coordination of investments on regional and national levels is a crucial aspect. The proposal to extend the simple and effective DABLAS Task Force coordination process to other areas (waste, non-point sources of pollution, water use projects, flood protection) should be pursued. With regard to waste, the opportunities for investment lending for the establishment of ship waste reception/treatment facilities in all major ports should be assessed.

Opportunities for promoting small-scale investments in this framework, but also through the Neighbourhood Investment Facility, should also be considered. This would include small grant projects, loans to smaller municipalities or groups of municipalities, especially in rural areas, so-called 'sub-projects' e.g. electricity saving in Waste Water Treatment Plants.

Recommendation: Black Sea countries, EU and other international organizations and initiatives in the Black Sea region to reinforce the development of inter-regional cooperation

Inter-regional cooperation should be reinforced with other regions. Particular interest has been raised with regard to inter-regional cooperation between the Black Sea and the Baltic region, and between the Danube and the Black Sea Region. This would also allow to involve other EU member states. Policy dialogue and exchanges of experiences could also be set up between the Black Sea Synergy and the Union for the Mediterranean processes.

CONCLUSION

There is no doubt about the political, human, economic and environmental consistency of the Black Sea Region. Countries and people surrounding the Black Sea are naturally led to communicate trade and cooperate. This is a region of significant biodiversity value to Europe at large, and a region already affected by environmental crisis that may worsen in future due.

This study has sought to show and to illustrate some of the environmental challenges now confronting the Black Sea Region. Transport infrastructure on land, at sea and on waterways is threatening ecosystems, causing accidents and contamination, and increasing atmospheric pollution. Because the region provides access to oil and gas, it is witnessing an increase in oil and gas terminals, tanker traffic and pipeline construction. An unsafe nuclear industry continues to operate in the region that once experienced the effects of the Chernobyl accident. Tourism, urban development and industrial growth are increasing, generating a boom in infrastructure development that is often a threat to biodiversity. Conflicts and other national security concerns also affect the environment, while climate change is expected to impact the region severely, particularly in agricultural and coastal areas. Addressing such environmental problems requires more than ever a regional approach.
The Black Sea Synergy proposed to focus especially on transport, energy, security, migrations and the environment. It will have at its disposal numerous policy tools already established by the EU under its accession and neighbourhood policies. But it also adds a political dimension and focus that can make an important contribution in driving environmental reform.

Experience shows that EU policies and its power of attraction can exert a powerful influence on the countries they embrace. The EU can, and should, work to ensure that its policies in the region contribute to its sustainable development. In the energy sector, it will have to work with countries in the region to explore and exploit the considerable potential for renewable energy production. This will include developing an energy policy of its own concerning the region as well as helping countries in the BSR to develop policies and legal frameworks that favour the development of renewable energies. International funding will have to be mobilized for this sector, including from international financial institutions and through the Kyoto mechanisms.
The EU will also have to work with Black Sea countries to investigate and anticipate the possible impacts of climate change, and develop strategies for adaptation. Migrations, also among the EU's key concerns in the context of the Black Sea Synergy, would be increased by the resource insecurity which climate change is likely to generate. They can be limited through well designed adaptation measures.
Regardless of the sector, translating decisions and policy into facts on the ground will also require an increase in environmental awareness and the political will to address environmental issues. The non-governmental sector has a crucial role to play in this. Independent civil society organizations that have succeeded in gaining the public's trust are uniquely placed to raise environmental awareness. Non-governmental organizations should be considered important partners in the context of future Black Sea consultations and they should be provided support, including through EU programs.
The effectiveness of environmental policy in BS countries is also an issue: it will require that the capacity of conservation and environmental authorities to operate and enforce the law is largely enhanced.

The Black Sea Synergy represents the EU's first step towards approaching the Black Sea Region as such. This study argues that boosting international cooperation will also be necessary to address the region's environmental problems, and points to ways of achieving this. Regional cooperation is particularly important when it comes to jointly managing a resource or an ecosystem. It is also essential to minimizing the negative environmental effects of infrastructure and other large-scale projects. Rivalries between major players in the Black Sea Region for instance, have led to the construction of pipelines in excess of the capacity required, causing unnecessary environmental disruption.

The challenge of the international cooperation in this field is made all the greater by numerous conflicts, frozen or not, as well as by tensions, rivalries and security concerns affecting relations between countries. Environmental cooperation, however, provides a good opportunity to develop confidence building measures, and Black Sea countries as well as the EU should welcome and support such projects and draw lessons from their limitations as well as constraints. Again, the civil society sector has particular potential in developing such projects, and should be recognized as such.

Europe has already experimented on regional cooperation around regional seas with the Northern Dimension, around the Baltic Sea, and with the Barcelona Process, around the Mediterranean. Both provide valuable lessons for the Black Sea. The Northern Dimension has succeeded in engaging Russia; the Barcelona process is developing dialogue among a great number of countries in a fragmented and divided region. The Black Sea Synergy will have to overcome both these challenges and can benefit from the experience acquired elsewhere.

Of course, the Black Sea Region already has institutions to build on: the Black Sea Economic Cooperation, the Bucharest Black Sea Convention and the DABLAS Task force in particular. These organizations will have to be strengthened, adapted and in some cases streamlined and coordinated to measure up to the challenges of sustainable development in the BSR.

Cooperation in other regions, finally, has also shown the importance of leadership: Romania and Bulgaria will have to continue and possibly step up their leadership roles in the region.

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APPENDICES

Appendix A
Main EU Initiatives in the region

Black Sea Synergy

The Synergy is a recent regional cooperation initiative of the EU complementary to existing EU policy framework. It aims to develop enhance cooperation within the Black Sea region and also between the region as a whole and the EU. In the energy context, this initiative focuses on the potential of the region to provide energy supply security diversification to the EU by upgrading the existing and constructing new energy infrastructure (increasing oil and gas imports). But according to the European Commission's Communication on this initiative "the EU is (…) helping the countries of the region to develop a clearer focus on alternative energy sources and on energy efficiency and energy saving, which will release important energy resources". It is not clear though if the renewable energy sources will replace internal demand or be exported.

Focus countries

Greece, Bulgaria, Romania, Moldova, Ukraine, Russia, Georgia, Armenia, Azerbaijan and Turkey

Focus areas

i) Democracy, respect for human rights and good governance;
ii) Managing movement and improving security;
iii) The "frozen" conflicts;
iv) Energy;
v) Transport;
vi) Environment;
vii) Maritime Policy;
viii) Fisheries;
ix) Trade;
x) Research and Education Networks;
xi) Science and Technology;
xii) Employment and social affairs;
xiii) Regional Development.

Sponsor

Co-finance is applied as a general principle. Community support could be available: under the national, regional and cross-border programmes of the ENPI, other external assistance instruments and, for EU Member States, the European Regional Development Fund.

Specific projects

The Commission commits itself to make use of the Joint Implementation of the Clean Development Mechanism of the Kyoto Protocol in order to promote regional-level activities to combat climate change.

Reference

Communication from the Commission to the Council and the European Parliament "Black Sea Synergy – A New Regional Cooperation Initiative", Brussels, 11.04.2007, COM(2007) 160 final.

The Baku Initiative

Short description

The Baku Initiative is a policy dialogue aimed at enhancing energy cooperation between the EU and countries of the Black Sea, the Caspian Basin and their neighbours. Its goal is to achieve progressive integration of the Black Sea and Caspian Sea region energy markets with the EU markets.

The 2nd Energy Ministerial Conference was held in November, 2006 and agreed on a new Energy Road Map which sets a long-term plan focusing on the four following priority areas: converging of energy markets; enhancing energy security; supporting sustainable energy development, including energy efficiency, renewable energy sources and demand side management; and attracting investment towards energy projects of common interest.

Time period

The initiative began as a result of the conclusions reached at the Energy Ministerial Conference which took place in Baku on 13 November 2004

Focus countries

Armenia, Azerbaijan, Belarus, Georgia, Iran, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan and the Russian Federation (as an observer)

Focus areas

Energy and transport

Sponsor

European Commission

Reference

Communication from the Commission to the Council and the European Parliament 'Black Sea Synergy - A New Regional Cooperation Initiative'
www.inogate.org

INOGATE

Short description

Inogate is intended to improve the security of energy supply through multi-annual technical assistance programmes. It is supported by the EU Black Sea and Caspian Sea Basin and its Neighbouring Countries Energy Cooperation Secretariat, and it was agreed at the Astana Ministerial Conference on 30 November 2006. Although it originally stands for "Interstate Oil and Gas pipelines to Europe", it has enlarged its scope since 2004 to encompass also the electricity sector and to address energy-related environmental issues.

Time period

It has been operational since 2001.

Focus countries

Currently 21 countries have signed or acceded to the Umbrella Agreement. From these there are 13 countries where the agreement is in force: Azerbaijani Republic, Republic of Belarus, Republic of Croatia, Hellenic Republic, Republic of Kazakhstan, Republic of Kyrgyzstan, Republic of Latvia, Romania, Serbia and Montenegro, Slovak Republic, Republic of Turkey, Ukraine, and Republic of Uzbekistan.
Note the absence of Russia.

Specific projects

Some of the main activities undertaken in 2001-2004 are: Design, Construction and Modernization of 10 Cross-border Gas Metering Stations, Construction of the new Eastern Europe Regional Natural Gas Metrological Centre (Ukraine, Belarus, Moldova), Upgrades to the Abovian Underground Gas Storage Station (UGSS) in Armenia, Procurement of emergency equipment for safety and security of regional oil and gas infrastructures in Caucasus and Central Asia, Elaboration of Reform Options for the Gas Transit of Ukraine, Completion of Feasibility Study for Multimodal Oil Transport System between Kazakhstan, Azerbaijan and Georgia, Development of INOGATE in Romania & Support for facilitating the Constantsa-Omisalij Oil Pipeline, Assessment of the Iran-Armenia Gas Interconnection, Promotion and Project Facilitation for the extension of the Odessa-Brody Oil Transportation System to Poland.

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BSEC (Black Sea Economic Cooperation Organisation)

Short description

Established in 1992 with Russia and Turkey as its founding members, and transformed into an international organization in 1999. Initially concentrated on economic cooperation but its focus has been gradually enlarged. It has proved to be "a confidence-building forum for discussion of common interests" but has had a poor performance (Tassinari, 2006).

Focus countries

Membership includes Greece, Bulgaria, Romania, Moldova, Ukraine, Russia, Georgia, Armenia, Azerbaijan, Turkey, Albania and Serbia. Seven EU Member States have observer status with BSEC (The Czech Republic, Germany, France, Italy, Austria, Poland and Slovakia). The Commission intends to seek observer status and to support EU Member States' applications.

Sponsor

European Commission

ODED-GUAM

Short description

This is the revival of the GUAM (Georgia, Ukraine, Azerbaijan, Moldova) US-backed initiative put forward in the 1990s. GUAM was restyled as the Organisation for Democracy and Economic Development (ODED-GUAM) in 2006 to focus on energy security across the Caspian-Caucasus-Black Sea axis, among other issues.

Focus countries

Caspian-Caucasus-Black Sea axis

Focus areas

Energy security, free trade area among the member states, as well as democracy promotion.

The energy community treaty

In October 2005, the 25 Member States, Bulgaria, Romania and the countries of the Balkans signed the *Energy Community South East Europe Treaty* aimed to establish a regional energy market for gas, petroleum products and electricity, and to integrate it with the EU's internal market. The Energy Community Treaty entered into force on 1 July 2006, extending the relevant EU energy *acquis* to the Western Balkan countries. It is an instrument that offers the possibility of full participation in the European internal market and focuses on market liberalisation, reducing sulphur

content of certain fuels and limiting the emissions of certain pollutants. It has been granted a $1 billion loan from the World Bank. The Commission's March 2006 Energy Green Paper[1] suggests that the *Energy Community* should embrace Turkey and Ukraine, both countries with a strategic importance for the transit of energy to the EU. Ukraine has already formally applied to join the Energy Community Treaty, though Turkey has so far rejected the idea.

Others

There are also other relevant initiatives. For instance: programmes of the UN, the OSCE, the OECD and the Council of Europe or the Black Sea Trust for Regional Cooperation of the GMF of the United States. These are regional cooperation programmes supported by international organisations and third countries. Other existing EU instruments, which have long been disabled in the Black Sea Region due to the lack of an EU common energy policy for the area, are: the Energy Commissioner's office, the EU's Special Representatives for the regions, and the EU mission in energy-producing and key transit countries.[2]

1 A European Strategy for Sustainable, Competitive and Secure Energy, March 2006, COM(2006) 105 final
2 See Socor (2006)

Appendix B
The European Neighbourhood Policy

The European Neighbourhood Policy (ENP) launched in March 2003[3] is aimed at developing a "zone of prosperity and a friendly neighbourhood … with whom the European Union enjoys close, peaceful and cooperative relations." The ENP gives to neighbour countries the opportunity to take a "stake in the internal market" and to participate in relevant Community programmes. Cooperation is based overall on a set of shared principles such as democracy and the rule of law.

The ENP is an element of the EU overall security policy[4] and of the EU's development policies, and in this context follows EU development policy rationales.

The ENP focuses, among others, on the Black Sea area. Its main operational tools are the ENP Action Plans mutually agreed between the EU and each neighbour country. The Action Plans set out a broad agenda for reforms that the neighbour countries commit to undertake over a three- or five-year period. To promote implementation of reforms, EU also commits to offer incentives in terms of trade, aid, political contacts and participation in Community programmes and activities. In the Black Sea Region ENP action plans are currently in force in Armenia, Azerbaijan, Georgia, Moldova and Ukraine.

The Commission is promoting a country-specific, "differentiated", approach and 'there are as many possible responses as there are partner countries, according to each partner's political situation, its level of ambition with regard to the EU, its reform agenda and achievements, and its level of socio-economic development'. [5]
As part of the EU's efforts to enhance and provide more attractive incentives to partner countries under the ENP, a Communication on "strengthening the European Neighbourhood Policy"[6] was published on 4 December 2006. In its Communication, the Commission committed towards increased thematic (on energy, transport, but also on environment) and regional (strengthening Black Sea Dimension) cooperation, increased civil society participation in the ENP/ENPI and an additional 1 billion € funding allocated to a Neighbourhood Investment Facility and Governance Facility. A communication on a "Strong European Neighbourhood Policy" was then published in December 2007 to take stock of the strengthening of the ENP process.

The EU has also developed the ENP in a regional perspective, notably through the Cross-Border Cooperation (CBC) Programme and along horizontal issues through the Thematic Dimension.

The CBC Strategy Paper[7] sets out the main issues to be addressed under the CBC detailed programming. The CBC Strategy foresees the development of particular programmes for shared sea basins including the Black Sea. In this case, partners will primarily represent the regional and sub-national administrative levels and local civil society organisations. Specific objectives foreseen include the development of sea-basin wide cooperation platforms and thematic networks inter alia in the environmental field; support for sea-basin wide planning in various areas including transport, energy, environment, maritime safety and risk prevention; support of processes and creation of multilateral contacts between NGOs and civil society groups in the EU and partner countries.

The Thematic Dimension,[8] introduced by the European Commission in its efforts to strengthen the European Neighbourhood Policy, assesses opportunities for reinforced regional cooperation in a range of sectors, including energy, transport and environment, across the entire ENP Neighbourhood. It also 'responds to the need to strike a multilateral/bilateral balance in the Eastern dimension of the ENP', an aspect only very partially considered so far. With regard to environment, the Thematic Dimension foresees some priority areas of action, namely the strengthening and/or streamlining of the implementation of existing multilateral agreements and cooperation frameworks, increased peer contacts across the region and the inclusion of all stakeholders, as well as exchanges between partners of regional seas conventions. Such exchanges are also foreseen in relation to maritime policy with the EU providing the initiative and support.
This reflection on the thematic dimension of the ENP is instrumental in prioritizing environmental cross-cutting issues, including sea basin environmental concerns. However, it does not provide overall political guidance as to how to streamline environmental considerations within the other themes such as energy or transport. These should not be developed in isolation. Overall guidance is key in ensuring the integration of environmental considerations and should be provided in the framework of the Black Sea Synergy.

Funding Associated to the ENP

From January 2007 the financial support to neighborhood countries is being provided under the European Neigh-

3 Communication of the Commission "Wider Europe, Neighbourhood: A New Framework for Relations with our Eastern and Southern Neighbours, COM(2003) 104 final
4 See for instance "A Secure Europe in a Better World – The European Security Strategy", 12 December 2003, http://ue.eu.int/cms3_fo/showPage.asp?id=266&lang=en&mode=g
5 Communication from the Commission, 'A Strong European Neighbourhood Policy', COM(2007) 774 final
6 COM (2006) 726 final, 4 December 2006
7 Cross-Border Cooperation: Strategy Paper 2007-2013 and Indicative Programme 2007-2010
8 Commission Non-Paper 'ENP – Thematic Dimension', COM(2006) 726 final
9 Regulation (EC) No 1638/2006 laying down general provisions establishing a European Neighbourhood and Partnership Instrument

bourhood and Partnership Instrument (ENPI).[9] Compared to the previous financial cooperation instruments, ENPI provides more flexibility and represents an increase in resources. The EU budget settlement for the period 2007-13 provides an approximate amount of €12 billion for this new instrument to be spent on the ENP countries, both East and South.

Under the ENPI, 73% of the funds are allocated to country programmes. The remaining amount is shared between the regional programmes, the CBC, the Neighbourhood Investment Facility and the Governance Facility.

The ENPI includes two regional programmes, one for the Mediterranean and one for the ENPI-East as well as a cross-regional programme covering both regions. The Eastern Regional Programme covers Belarus, Moldova, Russia, Ukraine and the three Caucasus countries and focuses on cross-cutting regional issues. For the period 2007-2010,[10] environment and forestry are within the key issues to be addressed in this framework, along for example energy and transport networks. The ENPI Eastern Regional Indicative Programme 2007-2010 foresees between 25 to 35% of available funds to be allocated to environmental issues. It defines the priority areas for 'environment and forestry', including support to the regional aspects of the EU Water Initiative and to regional seas, involving support to cooperation on the Black Sea, focussing on institutional support and prioritizing of investments and leverage of IFI funding. Other priorities in this area relate to the implementation of the Kyoto Protocol, sustainable management of forestry and environmental awareness raising. However, the only action provided for in this field in the Annual Action Programme for ENPI-East for 2007 relates to the improvement of Forestry Law and Governance (€6 million out of a total budget of €56 million).[11]

The CBC draws together funding from external (ENPI) and internal (European Regional Development Fund) sources in one single instrument and one single programming process. Within the whole CBC budget, the share of the Black Sea programme is very limited. For the period 2007-2013, €17.3 million are allocated to the Black Sea Programme. In contrast, €173.6 million is available for the Mediterranean and the total budget for CBC is €1,118.4 million. Turkey can take part in the Black Sea basin programme drawing upon its funds from the Instrument for Pre-Accession. Priorities include promoting economic and social development in the border areas, addressing common challenges including networking resources and competences for environmental protection and valorization, and promoting people to people type actions.

Within the ENPI envelope €700 million will be used to support a Neighbourhood Investment Fund, intended to provide grant support for lending operations by EIB, EBRD and other bilateral/international financial institutions.[12] Also an amount of €300 million is devoted to a Governance Facility that rewards every year best performing countries (in implementing the ENP).[13]

In addition to grant funding, neighbouring countries will be eligible, during the period 2007-2013, for loan financing through the EIB. In the Eastern Neighbourhood, €3.7 billion for the period 2007-2013 has been allocated for Russia, Eastern Europe (Ukraine, Moldova and – subject to future Council Agreement – Belarus) as well as Southern Caucasus (Armenia, Azerbaijan and Georgia). This new mandate is for "projects of significant interest to the EU in transport, energy, telecommunications and environmental infrastructure. Priority should be given to projects on extended major Trans European Network axes, projects with cross-border implications for one or more Member States and major projects favouring regional integration through increased connectivity."

While the legislation establishing the ENPI[14] clearly foresees a major role for the EIB, it also paves the way for lending by other IFIs, as it provides that Community assistance should normally be co-financed by the beneficiary countries through public funds, contributions or other sources.

10 ENPI East Regional Strategy Paper 2007-2013, Indicative Programme 2007-2010, 27 March 2007
11 It should be noted that several water related projects still financed under TACIS remaining budget are on-going or about to start in the region.
12 These funds will be allocated to large infrastructure projects, including in the transport, energy and environmental sectors
13 In 2007, Governance Facility allocations were granted to Ukraine and Morocco
14 Regulation (EC) No 1638/2006

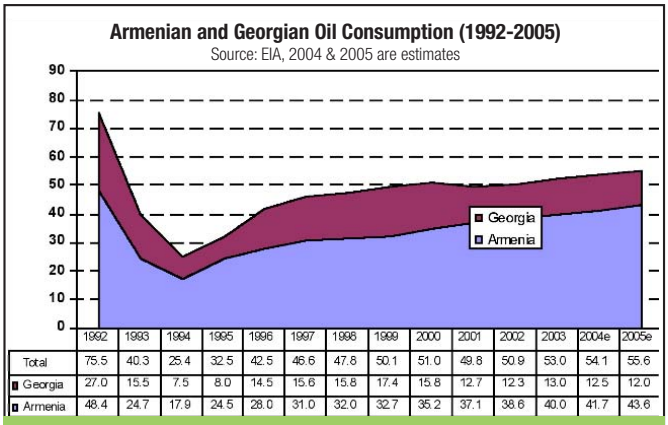
Appendix C
Country Energy Fact Sheets

Armenia

Armenia has no domestic oil production or refining industry and relies largely on imports to meet its energy needs. Oil imports are delivered by rail, while small amounts of gasoline and diesel fuel are transported by tanker truck, since Armenia lacks any pipelines for crude oil, oil products or for domestic distribution. (Inogate, undated)

Armenia's oil consumption in 2005 accounted for 44 thousand bbl/d. The country meets its oil demand trough import from Russia and Azerbaijan. After a sharp decrease in oil consumption following Armenia's independence in 1991, the country's consumption has been increasing slowly since 1995, as described in the following figure:

Armenian oil demand is constrained, largely, due to an economic embargo maintained by Azerbaijan to the East, and Turkey to the West. The embargo began shortly after the secession of Nagorno-Karabakh (DOE, 2005)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004e	2005e
Total	75.5	40.3	25.4	32.5	42.5	46.6	47.8	50.1	51.0	49.8	50.9	53.0	54.1	55.6
Georgia	27.0	15.5	7.5	8.0	14.5	15.6	15.8	17.4	15.8	12.7	12.3	13.0	12.5	12.0
Armenia	48.4	24.7	17.9	24.5	28.0	31.0	32.0	32.7	35.2	37.1	38.6	40.0	41.7	43.6

Figure 2:
Armenian and Georgian Oil Consumption (1992-2005) (DOE, 2005)

The largest portion of total energy consumption comes from natural gas. Armenia does not produce natural gas being thus largely dependent on imports. Armenia has been connected to the Russian gas network (ex USSR) since 1956. At present two gas pipelines connecting Azerbaijan with Armenia are closed and the only way to import gas into Armenia is from Russia via Georgia (Inogate, undated).

Russian firms has control over various energy assets in Armenia and in October 2006 Armenian officials announced that the Russian firm Gazprom would assume control of an Iranian-Armenian gas pipeline, which will be completed in 2008. Part of the gas will be used to generate electricity for Iran and Georgia, but the remainder may meet Armenia's consumption needs (Woehrel, 2007).

Electricity sector

In Armenia, non-thermal domestic electricity generation accounted for 60 per cent of total generation in 2002, with 32% provided by nuclear energy and 26% by hydropower Armenia has one nuclear power plant (Metsamor Nuclear Power Plant), which was built in 1980 with a design life of 30 years. The nuclear power plant supplies around 30 per cent of the country's electricity (Inogate, undated). The EU has requested the early closure of this nuclear power plant.

Besides the referred nuclear plant, Armenia has three thermal plants with a total capacity of 1,756 MW. These plants are operating beyond their planned lifetime and have a very low efficiency. Since all fossil fuels must be imported into Armenia, these plants are continually low on fuel and are unable to operate near capacity (EBRD, 2005).

Renewable Energy Sources Potential and Policies

Wind: There are 3 MW of wind energy capacity installed in Armenia. (EBRD, 2005) Armenia has a rather good potential for wind energy development. The most promising sites are (from north to south) Pushkin-Pass, Aragaz, Sevan Lake, Sisian-Pass, and Karakhach Pass.

Biomass: To utilize biomass would require significant analysis of the available residues. Given the amount of forestland, agriculture, and livestock, biomass fuels could prove to be a valuable source of energy. Although biogas is not currently explored, an attempt has been made to attract foreign investment for the construction of a large biogas plant. According to EBRD (2005), it would be possible to build a biogas plant within 12 to 15 years but funding is still an outstanding issue.

Solar: The average annual solar radiation in Armenia is approximately 1,720 kWh/m^2, which is higher than the average annual European solar radiation of 1,000 kWh/m^2. Over a quarter of the territory of the country has solar resources with an average intensity of 1,850 kWh/m^2. Despite the favorable climatic conditions and absence of own domestic fuels, solar energy potential is little explored in Armenia (EBRD, 2005).

Geothermal: Currently thermal water is used only for swimming pools and in therapeutic baths. At present only obsolete technologies are in use: spouting (free flow) well operation, direct use of geothermal water. Total installed heat capacity is less than 1 MWt. There is no national program promoting use of geothermal energy (EBRD, 2005).
Hydro electric: Hydropower provides a significant part of Armenia's electricity, accounting for 25% of electricity generated in 2000. The current hydropower capacity is concentrated on the Hrazdan River. The hydro potential of Armenia has been evaluated to be about 21.8 billion kWh/year, including 18.6 billion kWh from large and medium rivers and 3.2 billion kWh from small rivers. The economically feasible potential is about 3.3 to 3.5 billion kWh, with 1.5 billion kWh already utilized (EBRD, 2005).

Hydro electric: Hydropower provides a significant part of Armenia's electricity, accounting for 25% of electricity generated in 2000. The current hydropower capacity is concentrated on the Hrazdan River. The hydro potential of Armenia has been evaluated to be about 21.8 billion kWh/year, including 18.6 billion kWh from large and medium rivers and 3.2 billion kWh from small rivers. The economically feasible potential is about 3.3 to 3.5 billion kWh, with 1.5 billion kWh already utilized (EBRD, 2005).

Azerbaijan

Azerbaijan has its own oil and natural gas reserves. According to EIA, the oil production of Azerbaijan has risen to 860,000 bbl/d in 2007. The gas production in 2006 accounted 241 Bcf in the year 2006.

Azerbaijan is expected to export around 730,000 bbl/d of oil during 2007 (EIA). This oil is being exported via the Baku – Tbilisi –Ceyhan (BTC) pipeline system. This pipeline runs 1,040 miles from the capital Baku via Georgia to the Mediterranean port of Ceyhan. (See figure below)

Figure 3: The BTC pipe line (EIA)

There are other export routes besides the BTC line, such as the Baku-Novorossiysk pipeline also know as the northern route. This pipeline exports 40,000 bbl/d of oil via Russia to the Black Sea. The next pipeline, the Baku-Suspa line, also called as the Western early oil pipeline, goes from Baku to Supsa. The Baku-Suspa line has a capacity of 155,000 bbl/d. This pipeline has been shut down in 2007 for an extended repair program (EIA). The Baku-Tbilisi-Erzerum (BTE) gas pipeline also runs through Azerbaijan. This pipeline has a capacity of 8.8 billion bcm per annum.

Electricity

The Electric power sector has a generating capacity of 5.5 GW Azerbaijan has eight state owned thermal plants and six state-owned hydroelectric plants. The eight thermal plants account for 80 per cent of generating capacity.

Renewable energy policies and potential

Azerbaijan has a state policy on renewables that runs from 2005-2013.

Wind: According to EBRD, there is no installed wind energy capacity in Azerbaijan. There are only small wind units which were used for irrigation and lighting. The number and current operating conditions of these units are unknown. (EBRD)

Biomass: There are no biomass energy projects in Azerbaijan. However, there are several sources that could provide residues for biomass combustion. (EBRD)

Solar: There are no solar energy resources in Azerbaijan. The main reason why solar energy has not been exploited is due to domestic oil production. (EBRD)

Geothermal: There is a high potential for geothermal development in Azerbaijan. The prospective sources are recommended for therapeutic baths, industrial, and energy applications.
The use of thermal waters for greenhouse heating in the Lenkoran region, Kuraside zone Gandja, and Yalama-Khudat regions are found to be promising. The production capacity of the Lenkoran, Massaly, and Astara regions is estimated to be about 25,000 m^3 day. (EBRD)

Hydroelectric: There are three hydroelectric power plants of more than 100 MWe capacity in Azerbaijan. The annual hydropower generation provides 1.5 billion kWh therefore it meets 15% of power and 10% of energy demands of the power system. According to EBRD, potential hydro resources of Azerbaijan are relatively limited, but by concentration of hydro resources on the territory the potential is significant as compared to other CIS countries.

Bulgaria

Bulgaria does not produce significant quantities of oil and gas.[15] The only significant domestic fuel used is coal, primarily low-grade lignite that produces high levels of carbon dioxide when burned. Nuclear power is a relevant source of energy in Bulgaria and hydropower accounts for a smaller role.

However, Bulgaria is an important transit country for oil and gas, given its geographical location on the Black Sea. As a result, several pipeline projects are planned in Bulgaria. For instance, the 570-mile Albania-Macedonia-Bulgaria (AMBO) pipeline will connect the Bulgarian Black Sea port of Burgas with the Albanian Adriatic port of Vlore. Construction is expected to be completed by 2008-2009. In addition, in January 1997, Bulgaria, Greece, and Russia agreed to build the $700-million Burgas - Alexandroupolis

15 According to Oil and Gas Journal (OGJ) Bulgaria produced 3,000 bbl/d and consumed 180,000 bbl/d in 2005 (DOE, 2006).

oil pipeline linking the Bulgarian Black Sea port of Burgas with Alexandroupolis on the Mediterranean coast of Greece. This underground pipeline would allow Russia to export crude oil (up to 300,000 bbl/d) via the Black Sea, bypassing the Bosphorus. The project was stalled for several years by a wide range of technical and economic issues. In 2006 new conditions were proposed, with Russia being granted a 51% stake and Bulgaria controlling a minimum 24.5% of the remaining 49% of the oil pipeline project. Bulgaria's domestic gas consumption is imported primarily from Russia at subsidized prices, in exchange for Russia's use of Bulgaria as a transit country. Indeed, most of the Russian natural gas piped to Bulgaria moves on to other markets. Recently, though, Russia has expressed interest in paying transit fees in return for Bulgaria paying the market price for the imported natural gas (DOE, 2006).

In 2006 the U.S.-based AES Corp. announced that it will begin the construction of a 670-MW coal-fired plant to replace an existing facility (the Maritsa Istok unit-1 facility).[16] The project will be the largest single foreign investment in Bulgaria to date. The plant will replace lost generating capacity from the closure of two nuclear reactors[17] and is scheduled to be completed in 2009 (DOE, 2006).

Electricity sector

Bulgaria's nuclear facility Kozloduy produced more than 40% of Bulgaria's electricity in 2004, and has allowed the country to become the fourth major energy exporter in Europe (DOE, 2006). However, due to EU safety concerns, Bulgaria had to close two reactors in 2006.[18] This has produced an electricity shortage for the country and direct losses of over $2 billion, according to estimations announced in April 2006 by the Bulgarian economy and energy minister. As a compensation for the closures, Bulgaria received $688 million from the EU (DOE, 2006).

In January 2005, Bulgaria announced the construction of its second nuclear plant, which will be built along the Danube. It is estimated to cost between $3-5 billion and is scheduled to become operational by 2011 (DOE, 2006).

Bulgaria has 64 hydropower plants, with 2,700 MW of installed capacity, accounting for 19% of the country's overall generation. Bulgaria and Austria began the construction of an 85-MW hydropower plant on the Vacha River in April 2004 to be completed in 2009 (DOE, 2006).

Electricity from renewable energy sources increased from 7.2% in 1997 to 9.28% in 2004 (EC, 2007). According to the country's renewable energy target, consumption of electricity from renewable sources has to reach 11% of total electric energy consumption in 2010.

Renewable Energy Sources Potential and Policies

Currently large scale hydropower is the main source of electricity from renewable energy, but its technical and economic potential is already full exploited (EC, 2007). Good opportunities exist for biomass. The table below shows an annual average growth rate of 17% over the period 1997 to 2004 for biomass heat.

Table 5: Production of heat and cold from renewable energy sources (European Commission, http://ec.europa.eu/energy/res/legislation/share_res_eu_en.htm)

	Penetration 1997 (ktoe)	Penetration 2004 (ktoe)	Av. Annual growth %
Biomass heat	3 296	3 047	-1%
Solar thermal heat	4	4	0%
Geothermal heat incl. heat pumps	67	68	0%

Furthermore, some wind power pilot projects have been implemented in Bulgaria, but its contribution is minimal, as wind power accounted for 2 GWh in 2004. According to estimations a total wind energy capacity of around 2.200 – 3.400 MWe could be installed in Bulgaria. In addition, it is estimated that 200 MWe could be generated from geothermal sources using the solar potential which exists in the East and South of Bulgaria (EC, 2007).

The Bulgaria's National Programme on Renewable Energy Sources (NPRES), which will run from 2004 until 2010, focuses on increasing the share of renewable energy sources in the energy mix to 8% by 2010, particularly from non-hydroelectric renewable energy.[19] The following table shows the objectives of the NPRES for each renewable energy source:

Table 6: RES development according to the NPRES by technological area (http://ec.europa.eu/energy/idae_site/deploy/prj073/prj073_2.html):

Types of RES	Theoretical potential (toe/year)	Objectives for 2010 (toe/year)	Application areas
Biomass	3670962	380000	Heating, cooking, industry
Geothermal	481966	95143	Greenhouses, heating, hospitals, households
Solar	13*109	246000 (52500 in SPV and 160250 in STH)	Household, hot sanitary water
Wind pumps	75 * 109	31476	Electricity, pumps for irrigation

16 This facility is part of a complex consisting of four coal-fired plants which are specifically designed to use low-quality coal.
17 Bulgaria's nuclear facility Kozloduy.
18 After the closure of these two units only two reactors (No. 5 and No. 6) will be operational.
19 Mini-hydro is considered the only renewable energy technology well exploited at the moment. Therefore no additional plans of expansion have been made.

To achieve these goals Bulgaria adopted the following mechanisms: (i) mandatory purchase of electricity for preferential prices from generators with a production up to 10 MWh, which was replaced in 2007 by (ii) the Green certificate trading system, which requires public providers to supply minimum mandatory quota as a percentage of the total annual electricity production (EC, 2007).

In order to support industrial energy efficiency and small renewable energy projects in the private sector, the European Bank for Reconstruction and Development (EBRD) in cooperation with the Bulgarian Government and the EU developed in 2004 the *Bulgarian Energy Efficiency and Renewable Energy Credit Line* (BEERECL). Under this initiative 20% grant are awarded for renewable energy and 15% for energy efficiency. Up to September 2007, 94 projects have been financed under BEERECL, receiving loans worth more than €64.8 million, and generating annually more than 425,000 MWh of electricity and more than 615,000 MWh of heat energy (http://www.beerecl.com/index.htm)

Georgia

Energy consumption in Georgia is around 8,3 billion kWh, while local production accounts for 7,8 billion kWh. Hydro Power provides 5,6 billion kWh, with 14 medium and large hydro power plants, accounting for around 80% of electricity generation. Thermal power plants accounts for 2,2 billion kWh and estimations reveal that thermal will provide 29.15% of total demand in 2007. Estimations from the Government also forecast that consumption in 2007 will account for 9919 GWH. In this context, imports in 2007 are expected to reach 290 GWH, which represent 2.92% of total demand (Ministry of Energy of Georgia, 2006).

Besides its interest on developing energy transmission infrastructure, the Georgian energy strategy focuses on meeting the demand of electricity through its own energy potential. The Resolution of the Parliament of Georgia #3190 of 7 June of 2006 related to state policy in power sector reports that hydro resources should be supplemented by imports and later on by thermal generation. Currently the Government is also considering investing on several small and medium hydro power plants and wind farms of various capacities (Ministry of Energy of Georgia, 2006).

Three of the largest projects to multiply export options for Caspian energy to reach the EU (without using the Russian pipeline system) cross Georgia. These are Baku-Tbilisi-Ceyhan,[20] oil pipeline, South Caucasus gas pipeline, and Baku-Supsa, a.k.a the "Western Early Oil Route" (DOE, 2006).

Electricity

In Georgia hydroelectric power accounted for 81% of generation in 2001. Despite a diverse fuel supply base, several times throughout 2003 and 2004 non-payment disputes between Georgia and its natural gas and electricity suppliers, Russia and Armenia, have caused intermittent supply disruptions (DOE, 2006).

Renewable Energy Sources Potential and Policies

Solar: Due to the geographical location of Georgia, the emanation of the Sun is rather high. In most regions of the country there are 250-280 sunny days in a year, which is approximately 6000-6780 hours per year. The annual radiation of the sun varies depending on regions from 1250-1800 kWh/m^2, while the average sun radiation equals 4.2 kwh/m^2. The total annual solar energy potential in Georgia is estimated to be 108 MW, which is equivalent to 34 thousand tonnes of fuel. Despite the favorable conditions, the use of solar energy has been very low. Recently though there have been some projects using solar energy for heating (EBRD, 2006).

Geothermal: According to recent hydro-geological studies, the Georgian geothermal water reserves reach 250 mln m^3 per year. Currently there are more than 250 natural and artificial water channels where the average temperature of geothermal waters ranges from 30 to 110 C0, while the total debit is 160 000 m^3 per day and night. These water channels are grouped into 44 deposits. Within the territory of 3500 km there are bore-hole wells with the water temperature of 850 C0 and more (EBRD, 2006).
More than 80% of the geothermal deposits are in Western Georgia. In the Zugdidi -Tsaishi geothermal area, there are 9 productive, 7 reinjection and 3 observation bore-hole wells which are considered to be exploitable. It is known, that there are two independent horizons including thermal water on the deposits from which we can obtain up to 30 000 m^3 thermal water in case of reinjecting per day and night. The main port city in Georgia - Poti could be supplied with geothermal water through the Kvaloni and Menjisi water deposits (EBRD, 2006).

Hydro Power: Following deregulation process, the electricity sector currently allows third parties access to small hydro power plants. There are several private companies already established in the sector whose capacity varies from 16 to 112 MW (Ministry of Energy of Georgia, 2006).

Wind Power: According to the "Masterplane of Wind Power Development of the USSR till 2010" dated 1989, the technical potential of wind power in Georgia is estimated at 83 TWh a year. At 25% or greater capacity factor, this could result in over 2300 MW of installed capacity. The wind energy resources potential is thus good, but except for some small unities of about 6 kW each, there is no operative wind energy capacity in Georgia (EBRD, 2005).

20 Georgian environmental and security concerns have influenced the pipeline projects significantly. Several non-governmental organizations from Georgia and around the world, however, continue to express reservations about the pipeline project. Critics such as Amnesty International, Green Alternative, Friends of the Earth, and others have conducted their own studies and fact finding missions, concluding that the pipeline may still be environmentally hazardous.

Greece

Greece has oil reserves of just 7 million barrels according to the 2006 *Oil and Gas Journal* and produces negligible amounts of natural gas. Greece relies thus heavily on oil imports – primarily from Iran, Saudi Arabia, Russia, Libya and Egypt (DOE, 2006).

In January 1997, Bulgaria, Greece, and Russia agreed to build the $700-million Burgas - Alexandroupolis oil pipeline linking the Bulgarian Black Sea port of Burgas with Alexandroupolis on the Mediterranean coast of Greece. This underground pipeline would allow Russia to export crude oil (up to 300,000 bbl/d) via the Black Sea, bypassing the Bosphorus. The project was stalled for several years by a wide range of technical and economic issues. In 2006 new conditions were proposed, with Russia being granted a 51% stake and Bulgaria controlling a minimum 24.5% of the remaining 49% of the oil pipeline project. It is as yet unclear though whether Greece would accept the new conditions, as originally the three partners would share equal 33% stakes in the pipeline (DOE, 2006).

Lately Greece has increased its reliance on natural gas, with 80% of imports coming from Russia (DOE, 2006). But Greece is looking to lessen its dependence on Russian natural gas imports through a number of new pipeline projects.

In 2006, the Greek Parliament passed a government bill to deregulate the energy market, which will be undertaken in stages.

Renewable energy policies and potential

Hydro power has traditionally been important in Greece, and the markets for wind energy and active solar thermal systems have grown recently. In 2004, Greece generated 55.5 billion kilowatt hours (Bkwh) of electricity, of which approximately 75% was thermal and 21% hydroelectric, as reported in the figure below. Although most of the thermal energy is lignite-fired, some is oil-fired.

The Centre for Renewable Energy Sources (CRES) estimates that 15% of the country's electricity needs can be produced by wind farms, with wind-power capacity possibly expanding to 2,000 MW by 2010. Onshore wind power grew at an average annual rate of 61% between 1997 and 2004 and currently wind farms are already located on the Greek Island of Crete, Evia, Andros, and Samos. In May 2006, Rokas, a Greek wind farm operator, announced a $3.1 billion investment to install 44 wind parks with a combined generating capacity of 1,363 MW to be linked to the Chios, Lesvos, and Limnos islands in the northern Aegean. The project is one of the biggest investments in wind energy in the world. Greece currently has 475 MW of installed wind-power capacity, with Rokas accounting for 40% of total Greek wind power production (DOE, 2006).

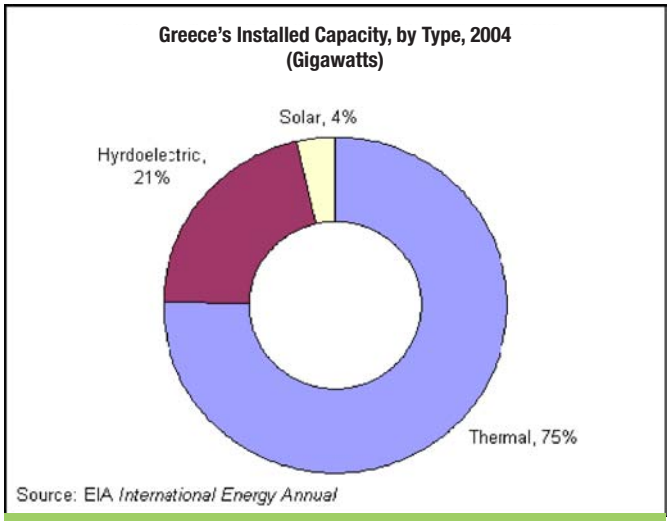


Figure 4: Greece Installed Capacity by Type (EIA, 2004)

Solar accounted for 1 GWh in 2004 and grew annually, on average, by 27% between 1997 and 2004. Since 2000, solar technology in Greece has almost tripled, and the EU report "Photovoltaics 2010" refers that Greece could use solar power to meet one-third of its energy demand. A 50-MW solar power plant, the first grid -connected solar system of a considerable size, is being constructed in Crete and a 100 -kilowatt PV park is planned for the island of Gavdos. In 2006, Rokas announced plans to invest between $190- $257 million to set up solar power stations of between 30 MW and 40 MW capacity throughout Greece (DOE, 2006).

Despite the significant potential of renewable sources, the majority of plants required to meet the growing electricity demand[21] is expected to be natural gas-fired. Recently though the Greek Parliament has reviewed the policy framework to boost renewable sources.

Greece has a target of 20.1% of gross electricity consumption from renewables by 2010. For biofuels, the following national targets have been set so far: 0.7% by 2005, 3% by 2007, 4% by 2008, 5% by 2009, and 5.57% by 2010.

Moldova

Moldova is the poorest country in Europe according to the World Bank. It does not produce significant quantities of crude oil[22] and has no natural gas resources, being dependent primarily on Russia for most of its supply. In recent years Russia has reduced supplies of natural gas to Moldova as a result of the country's debt. In addition, in 2006, when Moldova was paying its gas bill each year on schedule and

21 Electricity demand in Greece has grown nearly 50 percent over the last decade.

22 Moldova's reserves are estimated at 15 million barrels. In July 2005 the Moldovan fuel trader AS-Petrol opened a $4.0 million oil refinery, the first in the country, to process domestic crude oil extracted from a field in the southern region of Valeni, one of the country's two oil fields (DOE, 2006).

in cash,[23] Russian gas monopoly Gazprom increased gas prices, after stopping natural gas supplies in January due to a lack of agreement over prices.[24] Since the price increase, Moldova has started negotiating with Kazakh company Ascom to provide more than half of its supplies,[25] but transportation of the natural gas is still an outstanding issue (DOE, 2006). Furthermore, Gazprom owns a controlling stake of 50% plus one share in the MoldovaGaz company.

Moldova is an important transit country for oil and natural gas, given its geographical location, and it provides transit service for more than 20 billion cubic meters of Russian gas annually to Balkan countries and also to Turkey.

Currently, gas pipelines investment projects include: Kaushany-Kishinau and Drokya-Ungheny (Moldova) - Iashy (Romania) pipelines. The main purpose of the gas pipeline project Kaushany-Kishinau is to provide additional natural gas supplies to Kishinau, Moldova's capital, which is the largest consumer in the country accounting for more than 70% from the total consumption. The gas pipeline project Drokya-Ungheny-Iashy aims at linking Moldova's gas transportation system to the Romanian one in order to increase the annual load capacity of about 4 bln m^3 in Moldova.
At the moment there are no oil pipelines passing through Moldova and few projects have been discussed so far. These include: an oil pipeline linking Giurgiuleshty oil terminal (still under construction) to Chisinau, the capital of Moldova, and the ramification to Moldova from the existing Odessa-Brody pipeline (Inogate, undated).

Electricity sector

Moldova generates and consumes little electricity,[26] relying primarily on domestic thermal power plants and regional imports.[27] Hydropower accounts for a small percentage of the installed electric capacity. Moldova's electricity sector is partially privatized but most the country's thermoelectric power plants are unprofitable and have large debts.[28] There is a 750 kV line passing through Moldova to connect Ukraine with Romania and Bulgaria, but this line is not directly connected in the Moldovan power system (Osterreichische Enerieagentur – Austrian Energy Agency, 2007).

Renewable Energy Sources Potential and Policies

According to EBRD estimations there is a good potential for wind power development in Moldova, with total potential wind capacity around 1.000 MW. Areas with high wind energy potential include: in the north-east of the country, separate areas on the Podolsk Hills in the middle reaches of the Dniester River near the border with Ukraine; in the south-east, separate areas near the Dniester estuary; in the west, separate areas in the Carpathians piedmonts near the border with Romania. Together these areas represent about 10% of the country's territory. Currently, though, no wind turbines operate in Moldova (Osterreichische Enerieagentur – Austrian Energy Agency, 2007).

With the exception of some solar-heating plants with small thermal power, solar energy does not find significant application in Moldova. Solar radiation is measured only in the capital Chisinau and monthly and annual data are reported below:

Table 7: Monthly and annual total solar radiation incident on horizontal surface, MJ/m^2 (Osterreichische Enerieagentur – Austrian Energy Agency, 2007)

Location	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Yearly
Chisinau	126	166	303	460	607	692	685	598	440	281	117	92	4567

Table 8: Monthly and annual direct solar radiation incident on surface normal to sunlight beams, MJ/m^2 (Osterreichische Enerieagentur – Austrian Energy Agency, 2007)

Location	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Yearly
Chisinau	140	143	253	355	464	574	591	559	450	338	124	95	4086

According to EBRD (2005), besides coal and wood sunflower stems, shelled maize cobs, maize stalks and other agricultural wastes are currently used for heating in Moldavia. However, biomass is used inefficiently because of the inefficiency of domestic stoves.

Biomass potential in the country is estimated to be more than 370 thousand toe per year, but the high investment costs represent an outstanding issue to invest in biogas plants (Osterreichische Enerieagentur – Austrian Energy Agency, 2007).

Despite the large number of rivers in Moldova, the potential for hydroelectric generation is relatively low and there are only two major hydroelectric power plants. The largest of these is the Dubasari plant on the Dniester River, with an installed capacity of 48 MW (EBRD, 2005). The other significant power plant is located in the Prut River and has an installed capacity of 16 MW. According to EBRD, the

23 Socor (2006).
24 On 3 January 2006 the Presidents of Ukraine and Moldova joint appealed to the EU to intercede with Russia in support of the Ukrainian-Moldovan position, which specifically required involvement of EU experts in the two countries' respective negotiations with Russia and use of the EU market methodology for price formation on Russian gas supplies to Ukraine and Moldova. The appeal also urged an all-European approach to the issue of gas supplies. The joint appeal noted that "Russia's economic pressure is aiming to change Moldova's policy on conflict settlement in Transnistria and on our European choice". The EU response though did not address any of the suggestion included in the joint appeal. It appealed to Russia and Moldova on January 9 2006 to «urgently recommence negotiations and reach an equitable compromise», which ended up isolating Moldova (Socor, 2006).
25 Moldova's natural gas consumption accounted for 77 Bcf in 2004 (DOE, 2006).
26 In 2004 Moldova generated 4 Bkwh and consumed 7 Bkwh of electricity (DOE, 2006).
27 The electricity used in Moldova is generated 30 percent in Ukraine, 30 percent in Transnitria, and 40 percent in the rest of Moldova (Osterreichische Enerieagentur – Austrian Energy Agency, 2007). Moldova remains one of the largest consumers of the Ukrainian energy.
28 The Government plans to privatize the plants to modernize these power plants. In 2004, however, Moldova cancelled plans to privatize two power distribution companies when Russia's energy monopoly Unified Energy Systems (UES) was the only bidder (DOE, 2006).

greater potential for hydropower development in Moldova is in small hydropower construction. By the year 2010, through extending established hydroelectric plants and exploring existing potential, the installed power could achieve an additional 22 MW (EBRD, 2005).

The EU-Moldova Action Plan, signed on 22 February 2005 under the ENP framework, sets up a series of priorities. It also refers to updating the existing Moldovan energy strategy until 2020, which was adopted in 2007.'[29]

Romania

Romania has the largest oil reserves in Central and Eastern Europe and is a mature oil producing country. According to the 2006 Oil and Gas Journal, Romania has estimated reserves of 956 million barrels of oil. However, Romania is a net oil importer, depending primarily on Russia.

Romania contains proven natural gas reserves of 3.6 trillion cubic feet (Tcf), but production has fallen significantly in recent years (Oil and Gas Journal, 2006). Romania is a net natural gas importer, with supplies coming from Russia.

A number of pipeline projects are planned in Romania to increase natural gas transport capacity, with emphasis to the Nabucco project. In addition, construction on the Arad-Szeged pipeline, which runs from Arad in northwestern Romania to Szeged in southeastern Hungary, began in 2006 and is to be completed by 2008. The pipeline will enable Romania's system to link fully with the network in western Europe, and will stretch for 40 miles in Romania and 25 miles in Hungary. Another planned pipeline, the Siret-Cernauti pipeline, will connect Siret, in northern Romania to Cernauti in southwest Ukraine. The pipeline was originally contracted in 2004 between Romanian state-owned Transgaz and the Ukranian authorities, but was delayed by the political crisis in the Ukraine and construction has yet to begin.

The Giurgiu-Ruse pipeline would connect Romanian and Bulgarian gas transport systems and is currently under assessment by Transgaz, Bulgarian Bulgargaz and the Wintershall/Gazprom joint venture Wintershall Erdgas Handelshaus (WIEE). In May 2006, the Romanian Economy and Trade minister emphasized the need to continue with all pending projects, including the Siret- Cernauti and the Giurgiu-Ruse pipelines.

Electricity sector

Coal is the most important fuel for electricity in Romania, although there is a growing contribution from nuclear energy. Romania has one nuclear plant (Cernavoda) which maintains one sole working reactor that produces more than 10% of Romania's 50 Bkwh consumption of electric energy in 2004. In July 2006, the Romanian Finance Ministry borrowed $153 million to finance the completion of the second reactor, which is expected to start working in March 2007 and produce 18% of the country's electricity. Other two units are scheduled to be completed by 2012. Once the four planned energy facility will be completed, excess electricity could be exported to Turkey. An underwater power line under the Black Sea could connect the two countries.

EBRD has granted a $31 million loan in December 2004 to the Romanian state power transmission company (Transelectrica) for the construction of a 400,000-volt power line from Romania's Oradea to the Romanian-Hungarian border. The project is expected to be completed by 2008 and intends to boost cross-border capacity in the Region.

Renewable Energy Sources Potential and Policies

In Romania, the share of renewable sources in primary energy supply, as well as in electricity generation, is above EU average. In 2004 the majority of electricity production from renewable energy sources in Romania was generated through large-scale hydro power, accounting for 15,855 GWh. The high potential of small-scale hydro has though remained almost untouched, with 658 GWh in 2004. Despite the large potential of hydro power (6 TWh smaller than 10 MW), its average growth rate is rather small, with an average of 5 per cent increase between 1997 and 2004. Between 1997 and 2004, both the level of production, and the growth rate of most renewable sources have been stable. However, the amount of electricity from renewable sources in Romania has decreased from 17,520 GWh in 1997 to 16,518 GWh in 2004.

Wind farm in Romania accounted for 2 GWh in 2004. But the Romanian Government programme aims to increase the wind power contribution by installing a total capacity of 120 MW until 2010.

Production of heat and cold from renewable energy sources results mainly from biomass, which accounted in 2004 for 3.047 ktoe. Around two-thirds of renewable energy production in Romania is from biomass and most of the remainder from hydro power. Together they account for 29% of electricity generation. The following table provides additional information on the production of heat:

29 Republic of Moldova official website, "European Integration", 25.07.2007, http://www.moldova.md/en/europa/

Table 9: Heat from renewable energy sources (European Commission, http://ec.europa.eu/energy/res/legislation/share_res_eu_en.htm)

	Penetration 1997 (ktoe)	Penetration 2004 (ktoe)	Av. Annual growth %
Biomass heat	3 296	3 047	-1%
Solar thermal heat	4	4	0%
Geothermal heat incl. heat pumps	67	68	0%

Romania has introduced several measures to promote electricity from renewable sources:

- A quota system with tradable green certificates for green electricity has been in place since 2004. TGC are issued to electricity production from wind, solar, biomass or hydro power generated in plants with less than 10 MW capacity. The quota increases from 0.7% in 2005 to 8.3% in 2010.
- Mandatory dispatching and priority trade of electricity produced from renewable energy sources since 2004.

In addition, legislation on biofuels was adopted in December 2005. Until 2004 no significant biofuels production was taking place in Romania.

Romania has also introduced a renewable energy target. Consumption of electricity from renewable sources has to reach 33% of total energy consumption in 2010, which represents a target of 11% of gross energy in 2010.

Turkey

Turkey lacks significant domestic energy resources. Currently, Turkey produces small amounts of oil and poor quality coal, marginal amounts of natural gas and no nuclear energy. Hydropower is a significant energy source with more than 100 total plants and total installed hydroelectric generating capacity of 12.6 GW. However, energy from hydropower can be further developed (Shaffer, 2006 and Clough, 2007). As a result, 30% of the total energy demand is met by domestic resources, with 70% resulting from a diversified portfolio of imports (Ministry of Foreign Affairs, 2006).

Turkey's economy is highly energy intensive compared to most OECD countries. With regard to energy efficiency, the potential energy savings are estimated at 40% (EU, 2007).

Turkey is a net oil importer,[30] as described in the figure below, particularly from Russia, Iran and Iraq:

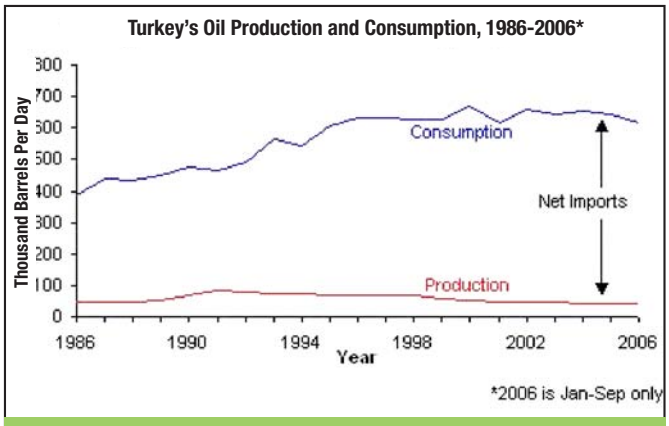


Figure 5: Oil Production and Consumption in Turkey, 1988-2006 (EIA, International Energy Annual International Petroleum Monthly, Short-Term Energy Outlook)

In addition, Turkey is an important transit country for oil, given its geographical location, linking oil producer countries in the Middle East and Caspian basin to the consumer markets. The Turkish government has raised concerns that increased oil tanker traffic through the Bosphorus increases the risk of oil spills (DOE, 2006). As a result, the country has established or considered a number of pipeline projects that would avoid shipping in the Bosphorus Straits.[31]

Turkey is a growing consumer of natural gas[32] and also an important natural gas transit country. In the last decades, Turkey has undertaken several infrastructure projects in order to position itself as an energy hub. As noted by Shaffer (2006) these multiple state projects carry environmental, social, and health implications. Diseases, spores, and alien species may travel along with oil and natural gas. As a result, Turkey should consider the long-term implications of being an energy hub.
Furthermore, there is a risk to be considered of oversupply. To date, Turkey has signed deals for around 1.8 Tcf per year of natural gas imports in 2010, more than 25% above the state-owned Botas forecast for Turkish natural gas consumption (1.4 Tcf) in that year.[33]

30 The majority of Turkey's oil reserves are located in southeastern part of the country. International oil majors Royal Dutch Shell and ExxonMobil are the largest foreign oil producers in Turkey (DOE, 2006).
31 These include the Baku-Tbilisi-Ceyhan Pipeline, the Kirkuk-Ceyhan Pipeline and also a number of Bosphorus bypass options (for instance the BTC Pipeline, and the Samsun-Ceyhan bypass).
32 Turkey has switched during the last two decades from power generation by coal-fired plants to those employing natural gas (Shaffer, 2006).
33 Shaffer (2006) addresses the risk of Turkey becoming oversupplied with natural gas, as most of the imports are based on long-term take-or-pay contracts. Turkey may be required to pay penalties in the future to suppliers, such as Russia and Iran, if it cannot use or re-export all the natural gas that it has committed to import. Turkey must therefore negotiate its contracts in a way that accommodates major contingencies that affect energy demand. In addition, Turkey needs to extensively expand its natural gas storage facilities.

Table 10: Status of natural Gas Pipeline Projects in Turkey (adopted from Clough, L.D., 2007)

Project	Status	Length (miles)	Max. Capacity (Bcf/y)
Blue Stream	In operation	750	565
Iran-Turkey Pipeline	In operation	750	495
South Caucasus Pipeline	In operation	430	700
Turkey-Greece Interconnector	In operation	186	407
Nabucco	Proposed	2,050	460 – 1,100
Egypt-Turkey Pipeline	Proposed	NA	NA
Trans-Caspian Pipeline	Uncertain	1,050	565

Renewable Energy Sources Potential and Policies

In order to meet its growing energy demand, Turkey aims at fully exploring its hard coal and lignite reserves, hydropower and other renewable sources, such as wind and solar.

In 2005 Turkey adopted a Renewable Energy Law in order to promote electricity from renewable energy sources. Supporting mechanisms such as feed-in tariffs and purchase obligation are included in the law. Furthermore, in May 2007 an Energy Efficiency Law was enacted. According to an analysis by the EU (2007) this legal framework needs to be supplemented by ambitious objectives in order to exploit the vast unused potential of renewable energy sources in Turkey. At current path, energy sources are not likely to contribute significantly to Turkey's energy mix in the near term.

Furthermore, in order to decrease dependence on imported fuels, Turkey intends to include nuclear energy into the country's energy mix. The Minister of Energy announced that construction of a total installed capacity of 5000 MW from nuclear power plants is expected to be completed by 2020[34] (Ministry of Foreign Affairs, 2006). In April 2006 the Turkish Prime Minister announced the locations where the construction of the nuclear power plants would take place: Sinop, Inceburun at Turkey's Black Sea Coast. However, financing is still an outstanding issue (Energy Review, 2007).

Ukraine

Ukraine has one of the most energy-intensive economies in the industrialized world.[35] Although energy consumption has dropped since Ukraine's independence in 1991, it continues relaying on imports, particularly on gas from Russia.[36] Domestic gas production meets about 25% of total demand and the rest is imported through Russian pipes (IEA, 2006).

Ukrainian energy policy focuses on improving energy security and reducing natural gas imports, as a result of growing tension between Ukraine and Russia in recent years.[37] But increasing domestic production will require improving the investment climate.

There is much opportunity to increase energy efficiency in the country, although investments are limited by low domestic energy prices, below international level[38] (IEA, 2006). Ukraine set up an energy efficiency policy in 1994, which could not be fully implemented due to insufficient funding. Then, in 2005, a government decree closed the State Committee for Energy Conservation and only recently, recognizing the void left, the government has established a new National Agency on Efficient Energy Use.

Energy transit through Ukraine is significant due to its geographical location, as 84% of Russian gas supplies to Europe passes through Ukraine via pipeline.[39] In recent years Russia has started developing some alternative routes to avoid passing through Ukraine (the North European gas Pipeline, Yamal and Bluestream, and South Stream), which could affect the geopolitical importance of Ukraine's transit business (IEA, 2006). Ukraine has also recently proposed a 'White Stream' pipeline which would transport gas from the Caspian to Ukraine and further to Poland. As regards oil, there exists the Odessa-Brody pipeline.

Electricity sector

Nuclear energy accounts for about half of total power production in Ukraine and the government would like to increase the share of nuclear energy in the energy mix. The following figure shows the Ukraine's electricity mix from 2002 to 2004:

34 The Energy Review (issue 7, from 19.02.2007, http://www.turkishweekly.net/energyreview/TurkishWeekly-EnergyReview7.pdf) quotes the Minister of Energy, Mr. Hilmi Guler, declaring that they would build three or five nuclear reactors by the year 2012, meaning that it would become operational in 2012.

35 According to IEA (2006) Ukraine uses energy about three times less efficiently than EU countries on average.

36 Because of its geographic location, Ukraine does not have many affordable and accessible supply alternatives.

37 Gazprom, Russia's natural gas monopoly, cut off supplies to Ukraine in January 2006 after its government refused to pay a fourfold increase in the subsidized prices. The crisis soon spread to the EU, as Ukraine began to divert gas from the pipeline that crosses its territory to meet domestic demand (Nye, J.S., 2006).

38 As noted by IEA (2006), greater energy efficiency will be much easier to achieve if domestic prices reflect the full, long-term costs, while today most energy prices in Ukraine only cover operational costs. Only oil and oil product prices are at international levels while coal prices do not cover production costs.

39 Ukraine is the largest gas transit country in the world by volume and also hosts major oil transit routes (IEA, 2006).

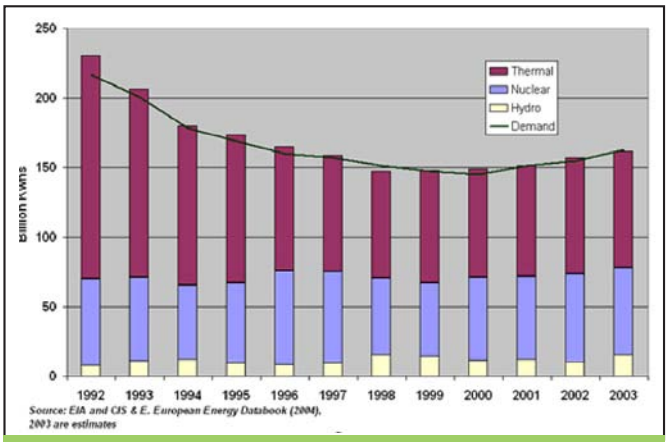


Figure 6: Ukraine Electricity Balance (1992-2004) (EBRD, 2005)

Renewable Energy Sources Potential and Policies

One of the main priorities of the 1996 National power Energy Programme was to promote the use of renewable energy sources in Ukraine. In 1997 the Government launched the "programme of state support for the development of non-traditional and renewable energy and small hydro- and heat-power engineering as a component part of national energy programme of Ukraine", which established a target of 10 percent of renewable energy as part of total energy demand by 2010. Furthermore, in 2001 the Ukrainian Parliament announced a bill for the development of renewable energy sources. But despite the several targets and programmes adopted to increase the use of renewable energy, implementation has been slow.

Indeed, non hydropower renewable energy sources accounted for less than 0.5 percent of the total primary energy demand in 2005 (EBRD, 2005) while the growing share of renewable energy in Ukraine's energy balance comes mainly from large hydro power plants (IEA, 2006).

The total installed capacity of Ukrainian wind farms is around 86 MW and the country has the only sizable national wind programme in the region. Ukraine's national programme for the development of wind power includes subsidies for the construction of wind power plants and establishes preferential tariffs for electricity from wind power plants. According to EBRD (2005) wind farm could account for 20 to 30 percent of Ukraine's demand for electricity power, if wind farm were built in the favorable areas for wind power development, which cover nearly 40 percent of the territory.

Use of biomass, mainly for heat is relatively common in rural areas and many agricultural villages have been switching to biomass-fired boilers for their small district heating systems (IEA, 2006). An assessment of Ukraine's potential on biomass reveals that the Ukrainian agricultural sector could supply 500 to 800 billion kWh of primary biomass per year on medium term (i.e. 2010-2015). This amount would allow significant export, considering the current national demand for transport fuels. Improvements of agricultural techniques could increase this potential further turning biofuels into a valuable export commodity for Ukraine (EBRD, 2005).

Solar radiation in Ukraine is of middling intensity. The average amount of solar energy received annually in Ukraine is about 1200 kWh/m^2 (4300 MJ/m^2). The southern and southeast regions of Ukraine have the largest potential for solar energy.[40] However, the current use of solar energy in Ukraine is minimal (EBRD, 2005).

Ukraine has considerable geothermal resources that can be used mainly for heat supply. In 2005 the total installed capacity of heat supply systems was 13 MWt, but according to a State programme the use of thermal water should increase by 2010 up to 250 MWt (EBRD, 2005).

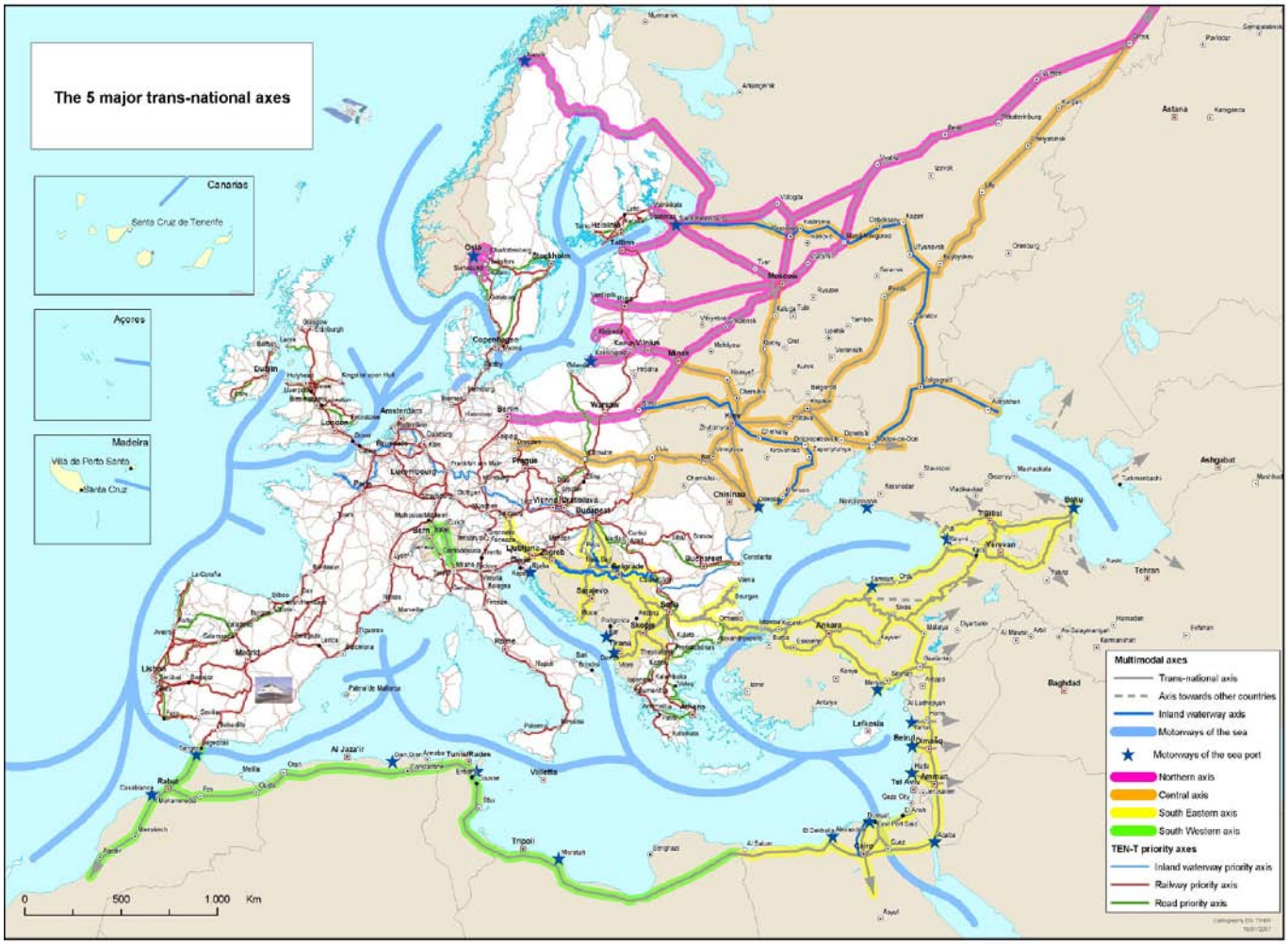
The average annual hydropower production in Ukraine was around 10 billion kWh in 2005, with an installed capacity of 4.4 million kWh. However, according to EBRD's estimations (2005) the potential of the Ukrainian hydropower for electricity generation would account for 20 billion kWh per year.

Programs of small hydropower development in Ukraine include reconstruction and renovation of previously constructed small hydro power plants (HPPs), adding small HPPs to water management projects with already existing water-retaining structures with the aim of utilizing waste releases (EBDR, 2005).

Ukraine has major opportunities through the Kyoto Protocol to finance energy efficiency and renewable energy. However, the government has been slow to pursue these opportunities and only in 2006 it approved rules for Joint Implementation projects (IEA, 2006).

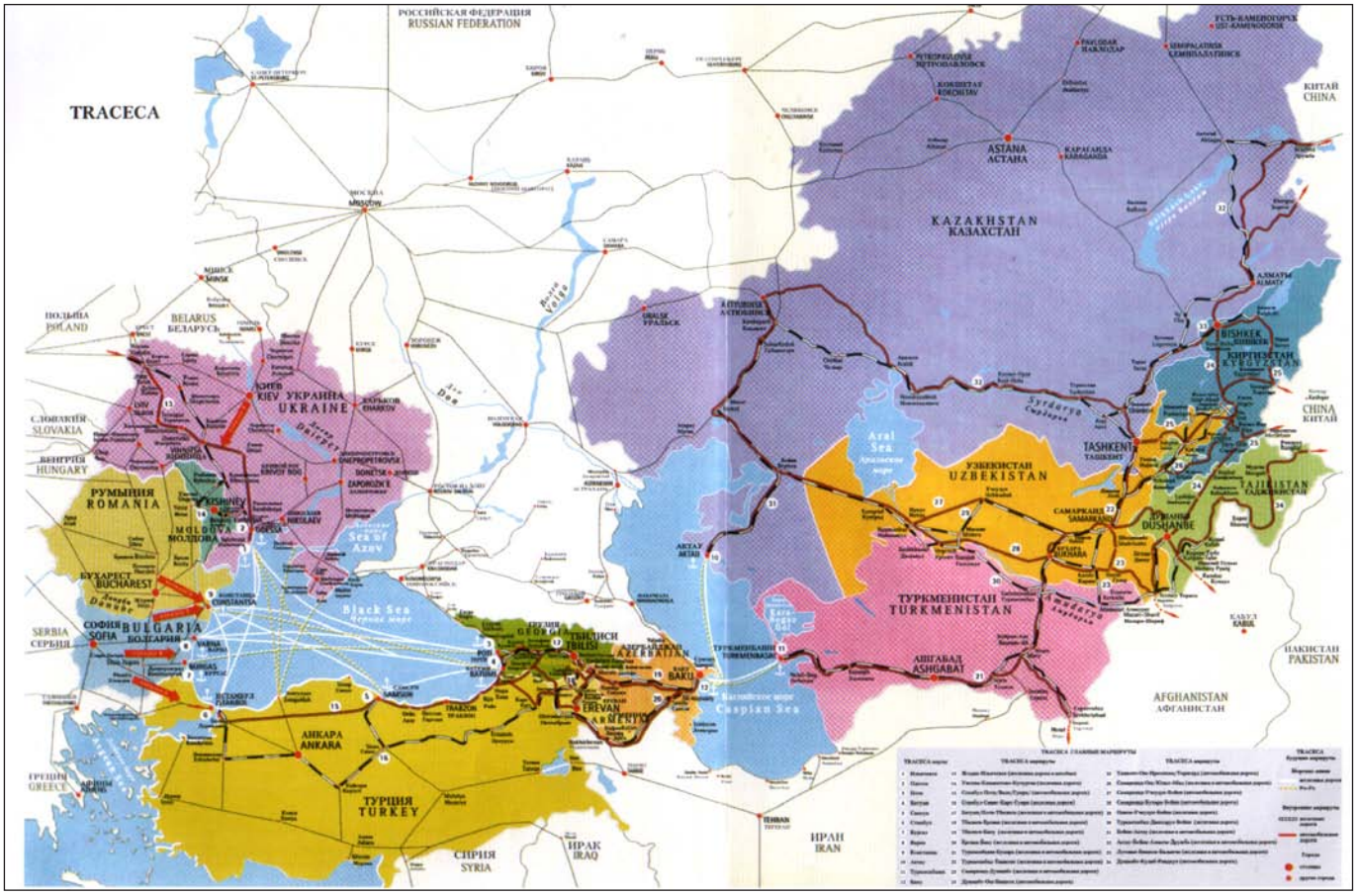
40 During the former USSR, Crimea was the all-Union test ground for solar energy. In the 1980s several projects were created in Crimea, including a solar steam-turbine power plant with a 5 MW capacity, and a large experimental complex of buildings with solar hot water and a heating and air-conditioning system. In addition, Crimea - especially its southern coast - is the largest resort zone in Ukraine, and the conservation of the unique natural environment prospects in the country is important. These two elements increase the potential of use of solar energy for generation of electricity and heat in Crimea.

Appendix D
The Five Transnational Transport Axes



Source: Building bridges. European Commission, Energy and Transport DG

Appendix E
The International Transport Corridor Traceca



Source: NAS of Ukraine

Appendix F
Port Infrastructure and Shipping Development of the Black Sea

Several dozens of seaports are functioning at the Black and Azov Seas coast. The main intermodal trans-Black Sea lines lie through the ports of Ilyichevsk, Odessa, Izmail, Nikolaev, Kherson, Mariupol, Berdyansk and Kerch (Ukraine), Constanta (Romania), Varna and Burgas (Bulgaria), Novorossiysk, Tuapse and Kavkaz (Russia), Poti and Batumi (Georgia), Istanbul, Deringe, Zonguldac and Samsun (Turkey). In future it is possible that the appropriate terminals in other ports will be involved in the intermodal traffic.

One of the biggest Black Sea port lying on European overland transport crossroad is **Constanta (Romania)**. Its freight turnover in 2004 was 50.43 million tonnes, including 386 thousand TEUs. At present the preparations are done to restart use of ferry facilities of the port to organize transportation to Turkey (Samsun) and Georgia (Batumi).

Bulgarian port Varna lies on crossroad of several active intermodal lines, among them is the ferry service Varna — Ilyichevsk — Poti/Batumi being one of the main branches of the TRACECA. In the recent years Bulgarian ports have been developing dynamically. In 2004 the total freight turnover ports Varna and Burgas reached 13,35 million tonnes. These ports lie on the Pan European transport corridor No. 4.

Turkish Black Sea ports together with the Marmara Sea ports are developing rather quickly and playing more and more significant role in the development of trade and transport connections between Europe and the countries of Western and Central Asia.

Georgian ports Poti and **Batumi** in the recent decades became sea gate for Europe and other countries and continents to the Caucasus and Central Asia. Turnover of the port of Poti in 2004 was 6.15 million tonnes of cargoes including 70 thousand TEUs. The port had practically passed through the main stage of commercialisation and is functioning quite efficiently. Plans for further development are being elaborated. Near Poti very promising raid oil port Supsa was built, its turnover in 2004 reached 6.2 million tonnes.

Russian Black Sea ports, first of all two biggest of them, **Novorossiisk and Tuapse**, handle significant volume of cargoes from ships to overland means of transport. Total turnover of these two ports made in 2004 89.8 million tonnes. At the moment they are not included into any international transport corridors, but their transhipment volumes place them among the most important ports of the Black Sea Region.

In 2004 seaports of **Ukraine** transhipped 111.43 million tonnes of cargoes and came closely to the highest total cargo turnover of the USSR times. In 2005 the volume of transhipment was 109 037.0 tonnes of cargo. (The technical capacity of seaports of Ukraine is 176,6 million tonnes/year (2006). One of the biggest ports in the region is **Ilyichevsk port**. In 2004 the total cargo turnover of Ilyichevsk port made 14.8 million tonnes, including 197 000 TEUs and 1.5 million tonnes of ferry cargoes. At present **Odessa port** occupies the third in the Black Sea place on its turnover. In 2004 it transhipped 30.5 million tonnes. Odessa port, same as Ilyichevsk, lies in the Pan European transport corridor No. 9. Especially quick in Odessa port is grows of container capacity — 203.5 thousand TEUs was transhipped in 2004. Increase in container turnover is 20 to 30 % annually.

Appendix G
More Specific Threats Regarding Inland Shipping on the Danube Wetlands Territory

Romania: **Calarasi-Braila (Technical Assistance for the improvement of the Navigation Conditions on the Danube – Calarasi– Braila section (ISPA2002/RO/16/P/PA/011)**

The project concerns 200 km section of the Danube River between the cities of Calarasi and Braila in Romania. Dredging works and closing lateral arms will affect the fish population in the Danube due to the loss of the main spawning grounds, i.e. for sturgeon. These are already reduced as a direct consequence of the loss of the Danube floodplain affect various fish species (incl. sturgeon) and bottom fauna (incl. benthic macro-invertebrates, an important food resource) particularly in the vicinity of the islands. modify the water's natural flow regime, which affects the natural floodplain that still exists on parts of the right bank of the most eastern arms of the Danube between Calarasi and Braila, i.e. the Danube between Calarasi-Ostrov-Harsova and the Dunarea Veche (Macin) arm in Tulcea and Constanta counties. Harm the natural erosion sedimentation processes that form the islands and their sandy beaches. These areas are considered important feeding and resting areas for many important bird species, such as Dalmatian and Great White pelican, Pigmy cormorant, and herons.[41]

Ukraine: **Bystroye canal (Danube Delta)**

Phase I of the Canal, which began in 2004, was completed and larger, sea-going ships started using the Bystroye Canal. However, the canal quickly silted up its previous depth, and therefore became fit for navigation. Dredging to reopen the canal began in November 2006 and was completed in April 2007. Since then, ships have been once again using the canal. Phase II of the project, which includes deepening of the canal as well as construction of a dike before arms of Danube. The construction of the Bystroye canal is one of treats to biodiversity conservation of the Danube Delta[42] and Black Sea area near Danube.

Moldova: **International Free port Dzhurdzhuleshty**

Port is located on the left bank of Danube on the area of 435 meters in area of Dzhurdzhuleshty between Galats (Romania) and Reni (Ukraine).
Danube contamination by the oil products as a result of building and operation of Dzhurdzhuleshty oil terminal is pacing the main threat to the environment in transboundary context. Increasing passage and manoeuvring of vessels in proximity of Reni also increase the threat of environmental catastrophes because of vessel collisions. Building and exploitation of oil terminal of Dzhurdzhuleshty presents a potential threat for: Danube Delta ecosystem and northwestern part of the Black sea; Valuable natural objects: Biosphere reserve «Danube Delta» (Romania) and Danube Biosphere Reserve (Ukraine).

41 www.danubecampaign.org
42 Ramsar sites

Appendix H
List of Current Transport Projects in the Black Sea

PROJECT NAME	LOCATION COUNTRY	PROJECT TYPE	SHORT DESCRIPTION	COMMENTS
Inland Navigation				
Danube between Bulgaria and Romania	Bulgaria, Romania	Navigation - TENs	Feasibility study 2007-2008 (works planned at 152 M€ for 2009-2012)	Negotiations foreseen between the Romanian and Bulgarian Environment and Transport Authorities in order to mitigate the adverse impact on the ISPA assistance for Romania (2.7 M€) was contracted in May 2007 to produce a feasibility study including EIA for the section Iron Gate II (rkm 863) to Calarasi/ Silistra (rkm 375)
Danube: Calarasi – Braila (km 345 – 175)	Romania	Navigation	Feasibility study and technical project including EIA were finalized in 2006 (1.64 M€ ISPA and state funds). Received stakeholder comments led to modifications of the technical project Environment Permit was issued by Ministry of Environment in February 2007. Tender procedure for the works supervision was finalized in 09/2007; tender procedure for the works contract will be finalized by the end of 2007.	EU Technical Assistance (ISPA) for the improvement of navigation conditions meets the Danube Commission recommendation (2.50 m): This is part of Corridor no. VII with many bottlenecks below 1.5 m. The project aims to realize bottom sills, bank protection, groins, river bed calibration and stabilization. Estimated costs (according to feasibility study): 56 M€: Phase I: 37.7 MEUR with 50% from ISPA fund (works 35.55 M€, supervision 1.7 M€). Period: 2008 – 2010 Phase II: 20.45 M€ from EU cohesion funds and state budget, period: 2011 – 2013
Maritime Danube and Sulina channel	Romania	Navigation	Feasibility studies and works for every component of the project in different stages of elaboration, implementation	Improvement of navigation conditions of the Danube and its maritime sector; bank protection of Sulina channel (part of Corridor no. VII) Total costs: 76 M€ (38 M€ state and M€ loan from EBI). Implementation: 2004 – 2009. Project components: Banks protection on Sulina Canal Signalization and topographical measurement system for the Romanian Danube
Danube Free Port of Moldova	Moldova	Navigation	Port opened in 2007	Bank protection on Sulina Channel (64 M€), topographic and hydro-graphic survey and signaling system on the Danube (5 M€)
Romanian Danube Delta	Romania	Navigation	Works 2006-2009	Bank protection on Sulina Channel (64 M€), topographic and hydro-graphic survey and signaling system on the Danube (5 M€)
Ukrainian Danube – Black Sea deep water fairway	Ukraine	Navigation	First phase	Works on the future revival and creation of the protecting dike: 12 M€ in 2007, 18 M€ in 2008

Appendix H
List of Current Transport Projects in the Black Sea

PROJECT NAME	LOCATION COUNTRY	PROJECT TYPE	SHORT DESCRIPTION	COMMENTS
Ports and terminals				
Yuznyi oil terminal	Ukraine	Navigation	Teminal is opened	First phase: 8-9 mil tonnes of oil per year Second phase: 40 mil tonnes of oil per year
Dewelopment of infrastructure of Illichevsk Sea Port	Ukraine	Navigation	Preparation of the project	The credit of the European Reconstruction and Development Bank 25 M€
Odessa container terminal	Ukraine	Navigation	Feasibility studies	Transshipments of 600000 - 1 mil of containers per year
Illyichevsk container terminal	Ukraine	Navigation	Feasibility studies and works	Turnover well be 1,5 mil of TEU till 2010 year.
Oil port Supsa	Georgia	Navigation	The oil port Supsa was built in 2004	The turnover in 2004 reached 6.2 million tonnes.
Novorossiysk grain terminal	Russia	Navigation	Feasibility studies and works	-
Novorossiysk oil terminal	Russia	Navigation	Feasibility studies and works	-
Novorossiysk container terminal	Russia	Navigation	Feasibility studies and works	Turnover well be 250 000 of TEU till 2010 year.
Tamansky peninsula Zhelezny Rog port	Russia	Navigation	Feasibility studies and works	Turnover well be 12 mil tonnes till 2010 year.
Completion of the north breakwater. Port of Constantza	Romania	Navigation	The investment consists in the completion of the north breakwater according to the initial 1985 advised investment regarding the Port of Constantza breakwaters. The actual breakwater will be extended with another 1.050 m right within the South breakwater and -24 m bathymetric line. Projects promoted for financing.	Operational Transport Programme 2007-2013 (SOPT 2007-2013).
Infrastructure on Pier III S, dedicated to specialized terminals. Port of Constantza	Romania	Navigation	The completion of this infrastructure will create great development oportunities for a specialized terminal which will assure deep quaydepths, allowing the accomodation of high capacity container vessels. The investment consists in the development of mooring quays and the completion of the existing one and also in reclaiming 35 ha of Pier III S territory from the sea using filling material and groundwork.	Operational Transport Programme 2007-2013 (SOPT 2007-2013).
Systematization and Consolidation of adjacent areas of the Port of Constantza between Gate 1 and Gate 7	Romania	Navigation	The completion of this project is a necessity for the protection of the port environment in accordance with the ISPS Code. Having in view the necessity of this project for the cliff area of the city, a protocol has been signed between NC MPA SA Constantza and the City of Constantza regarding the development of a project to consolidate the cliff area between Gates 1 and 7.	Operational Transport Programme 2007-2013 (SOPT 2007-2013).
Road transport				
Ring BS road	Turkey, Georgia, Russia, Ukraine, Moldova, Romania, Bulgaria	Road transport	Feasibility studies	During discussion
Upgrading of road Lviv-Krakovets	Ukraine	Road transport	Feasibility studies and works	The credit of the European Reconstruction and Development Bank. Estimated cost from 270 to 390 mln. Euro; 84.4 km highway – 78.40 km new construction, 730 ha of land allocation; shortcomings in the state EIA examination; lack of public participation; no assessment of impact on threatened species; forced resettlement; threat to recreation potential.
Railway				
Development of the railway capacity in the river-maritime sector of Constantza Port	Romania	Navigation, Railway	The investment consists in the development of a systemized railway complex (switchyard) in the river-maritime sector, which will assure an unitary and optimal service for the present and future port operators, allowing a complex and flexible railway operation of the area.	The project was promoted in the SOPT 2007-2013.

Appendix I
NGO Declaration

The Black Sea (BS) and the Environment
(Greening the Black Sea Synergy)

Civil society position paper addressed to the BS Ministerial Conference in Kiev,

February 14, 2008

ODESSA, February 7, 2008

An alliance of Environmental NGOs,[43] who met in Odessa on February 7, 2008, at the invitation of the Heinrich Böll Foundation and WWF:

- Welcome the Ministerial Conference, organised by the Government of Ukraine with the participation of the EU, as an important step towards long term regional cooperation in the BS region.[44]

- Wish to stress the importance of the EU Black Sea Synergy, as a critical instrument to promote sustainable development, environmental protection, integration and governance, and an opportunity for "stimulating a regional dialogue with civil society" in the BS region.

- Call for greater involvement of the EU in the Black Sea regional cooperation by promoting political dialogue and sustainable development.

- Note the considerable environmental values of the Black Sea Region, the many services its natural environment provides to human society and economies and the presence in the region of particularly sensitive areas; and point out that regional environmental cooperation, can also contribute to reinforcing cooperation in the region more generally.

- Highlight that climate change is leading the region to a scarcity within the natural resource base, in particular fresh water and may lead to irreversible environmental degradation, increased poverty and migration flows if immediate, coordinated and cooperative action is not taken.

- Strongly believe that national and international support for concrete environmental projects, with involvement of all stakeholders, will strengthen confidence, stability and cooperation in the so-called frozen conflicts.

- Recognise that a severe and additional pressure on the BS environment stems from recent illegal, uncontrolled and unsustainable tourism developments within existing protected areas and furthermore the privatisation of state lands will make the establishment of protected areas increasingly difficult.

- Stress that fossil and nuclear power are not solutions to climate change as fossil fuel based energy leads to further greenhouse emissions and nuclear energy poses a severe risk from its hazardous waste. These sources of energy must be phased out as a necessity for sustainable life on our planet. Oil and gas extraction from the BS shelf is a major threat to marine protected areas and wetlands.

- Are concerned by rapidly increasing environmental impact of transportation, especially shipping of oil by sea as between BS countries as well through the Bosphorus Strait. Neglecting of modern safety standards and regulations increases probability of accidents unfortunately exemplified by the recent one in November 2007 (Kerch accident).

- Request attention to the construction of Winter Olympic 2014 facilities within protected areas of the Sochi National Park and the buffer zone of the Caucasian State Reserve.

43 List of NGO attending the meeting is enclosed. Representatives signed in their personal capacity.
44 Black Sea Synergy countries include: Armenia, Azerbaijan, Bulgaria, Georgia, Moldova, Romania, Russia, Turkey, Ukraine, Greece

NGOs request the countries of the Black Sea Region and the EU to:

1. Implement the Aarhus Convention to ensure civil society organizations have access to environmental information, participation and access to justice and are involved in the development, implementation and evaluation of regional sustainable development policies as well as in the reform process in every BS country.

2. Ensure that civil society is able to participate effectively in the development and implementation of the Black Sea Synergy.

3. Treat environmental NGOs as important peace building actors in conflicting areas and to establish a special EC grants program dealing with activities related to conflict resolution.

4. Promote biodiversity conservation, notably through the establishment or strengthening of existing protected areas networks, in particular transboundary protected areas in conflict zones.

5. Promote implementation of the SEA[45] and EIA[46] legislation (UNECE and EU) and ensure careful and proper assessment of future development plans with particular attention to protected areas.

6. Support fundamental research for sound decision making. Encourage joint studies and monitoring of the state of the environment and natural resources coordinated at the level of the BS countries.

7. Promote technology transfer of the best available energy conversion and end-use technologies together with decarbonisation of economies. Obsolete technologies and the waste materials produced in one country should not be exported to countries with lower standards.

8. The energy end-use efficiency and renewable energy integration should be given a priority in the regional cooperation.

9. Phase out existing subsidies for fossil fuels and nuclear energy.

10. Promote international safety rules and standards and properly coordinate the construction of oil infrastructure by BS states. Avoid duplication of terminals due to political reasons and competition.

NGO participants

Association for Sustainable Human Development, Armenia

European Integration, Armenia

Institute for Peace and Democracy, Azerbaijan

Environmental Law Center "Ecolex", Azerbaijan

Bulgarian Black Sea NGO Network, Bulgaria

Georgian Energy Efficiency Center, Georgia

Green Alternative, Georgia

CEE Bankwatch Network, Georgia

Ecotiras - International Environmental Association of Rivers Keepers, Moldova

NGO "Ecospectrum-Bender", Moldova

Mare Nostrum, Romania

"Save Taman'!", Russia

Environmental Watch on North Caucasus, Russia

Russian Geographical Society, Russia

Black sea NGO Network, Turkey

EUROSOLAR (Turkish Branch of EUROSOLAR European Association for Renewable Energies), Turkey

KADOS Kadikoyu Friends of Science Culture and Art Association, Turkey

TÜRÇEP Environmental NGOs Platform of Turkey

BAKÇEP Western Black Sea NGOs Platform, Turkey

MARÇEP Marmara Region Environmental NGOs Network of Turkey

Ecoclub Ukraine, Ukraine

Centre for Black Sea Studies, Ukraine

Centre for Regional Studies, Ukraine

Econad, Ukraine

Resource & Analysis Center "Society and Environment", Ukraine

National Ecological Centre of Ukraine

ECOPRAVO Lviv, Ukraine

NGO Black Sea Women's Club, Ukraine

Youth Ecological Center, Ukraine

Wetlands International, Ukraine

WWF European Policy Office, Belgium

WWF- Danube-Carpathian Programme Office, Austria

WWF Caucasus Programme Office, Georgia

WWF- Danube-Carpathian Programme Office, Ukraine

45 Strategic Environmental Assessment
46 Environmental Impact Assessment

List of abbreviations

AI	Amnesty International
BSC	Commission against the Pollution of the Black Sea
BSEC	Black Sea Economic Cooperation
BSEP	Black Sea Environmental Programme
BSERP	Black Sea Ecosystem Recovery Project
BSR	Black Sea Region
BTC	Baku-Tbilisi-Ceyhan (BTC) Pipeline
CEE	Central and Eastern Europe
CIA	Central Intelligence Agency
CIS	Common Implementation Strategy
CNA	Centre for Naval Analysis
CNAS	Centre for a New American Security
CSIS	Centre for Strategic and International Studies
DABLAS	Danube Black Sea Task Force
EAP	Environmental Action Plan
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECMT	European Conference of Ministers of Transport
EEA	European Environmental Agency
EECCA	East Europe Caucasus and Central Asia
EfE	Environment for Europe
EIA	Environmental Impact Assessment
ENP	European Neighbourhood Policy
ENPI	European Neighbourhood and Partnership Instrument
ENVSEC	Environment and Security Initiative
ERTMS	European Rail Traffic Management System
EU	European Union
EUWI	EU Water Initiative
GEF	Global Environmental Facility
GDP	Gross Domestic Product
HELCOM	Helsinki Commission, Baltic Marine Environment Protection Commission
HLG	High Level Group
HNV	High Nature Value
IA	International Alert
ICPDR	International Commission for the Protection of the Danube River
IFIs	International Financial Institutions
IfP	Initiative for Peacebuilding
IMO	International Maritime Organization
IPA	Instrument for Pre-Accession
IPCC	Intergovernmental Panel on Climate Change
ISPA	Instrument for Structural Policies for Pre-Accession
ITC	International Transport Corridors
IWRM	Integrated Water and River Management
IWT	Inland Waterway Transport
MAP	Mediterranean Action Plan
MEA	Multilateral Environmental Agreements
MIPT	Memorial Institute for the Prevention of Terrorism
MoS	Motorways of the Sea
NATO	North Atlantic Treaty Organisation
NDEP	Northern Dimension Environmental Partnership
NIB	Nordic Investment Bank
NPD	National Policy Dialogues under the EU Water Initiative
NGO	Non-Governmental Organization
ODED-GUAM	Organisation for Democracy and Economic Development (Georgia, Ukraine, Azerbaijan, Moldova)
OECD	Organization of Economic Cooperation and Development
OSCE	Organisation for Cooperation and Security in Europe
OSPAR	Oslo-Paris Convention on the protection of the marine environment of the North-East Atlantic
PKK	Kurdish Worker's Party
RAMSAR	Convention on Wetlands
REC	Regional Environment Center
SEA	Strategic Environmental Assessment
SOPT	Sectorial Operational Transport Program
SPA	Special Protection Area
TDA	Transboundary Diagnostic Analysis
TEN-T	Trans-European Network for Transport
UNDP	United Nations Development Program
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
WBGU	Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderung (German Advisory Council on Global Change)

THE PROJECT PARTNERS

HEINRICH BÖLL STIFTUNG
EU REGIONAL OFFICE, BRUSSELS

The Heinrich Böll Foundation sees itself as an agency for Green ideas and projects, as well as a forum for the exchange of ideas both nationally and internationally. Working together with more than 100 project partners in over 60 countries, it supports the development of democratic civil societies worldwide. The Heinrich Böll Foundation maintains offices in 24 countries. A particular focus of the Foundation's work is the promotion of sustainable development.

For more information about the project:
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WWF is one of the world's largest and most experienced independent conservation organisations, with almost 5 million supporters and a global network active in over 100 countries. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable and promoting the reduction of pollution and wasteful consumption.

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