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Energy and Climate Change in Russia

Note

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EXECUTIVE SUMMARY

The first chapter of the report addresses the impacts of climate change in Russia, including the expected impacts on ecosystems, by reviewing the most recent studies available. In addition, the chapter analyses how Russia's oil and gas contributes to climate change worldwide, given the large availability and historical reliance on hydrocarbons, lack of regulation that specifically addresses the development of renewable energy (despite the country's huge potential), and the lack of financial incentives to influence market behaviour.

The second chapter identifies the main opportunities in Russia to mitigate climate change, focusing on the country's potential in supplying the global carbon market with emission reductions. This can be achieved mainly through the following instruments: hosting Joint Implementation (JI) projects, LULUCF (Land Use, Land Use Change and Forestry) activities, participating in International Emissions Trading (IET), or applying some Green Investment Schemes (GIS). The chapter emphasizes the results and current perspectives of each of these options.

Chapter 3 of the briefing presents the framework of cooperation between the EU and Russia. It covers the framework of the Partnership and Cooperation Agreement (PCA) and the ongoing negotiations for its successor. In addition, the chapter addresses the main outcomes of the EU-Russia "energy dialogue", and the debate concerning the ratification by Russia of the Energy Charter Treaty (ECT).

Finally, Chapter 4 of the report suggests some opportunities for enhancing EU-Russia cooperation on climate change. These include: (i) engaging Russian attention on climate change policy by including strong climate provisions on the new EU-Russia agreement being negotiated; (ii) establishing a joint Green Investment Scheme (GIS) to facilitate the implementation of concrete mitigation and adaptation projects; and (iii) using some existing, rather technical, multilateral subregional forums outside the framework of the PCA and its intended successor agreement to further engage Russia in the climate change debate and increase cooperation between the two sides.

1 ENERGY AND CLIMATE CHANGE IN RUSSIA: SETTING THE CONTEXT

Despite Russia's crucial role in the entry into force of the Kyoto Protocol[1], the climate change issue has not gained a high profile on the national political agenda. One of the reasons is probably the fact that climate change is still regarded by many Russians as not being a serious environmental problem, compared to other concerns in other policy areas and/or more immediate environmental priorities[2].

Climate change influences the dynamics of Russian society in four ways:

- First is how climate change will impact the country, with consequences on the environment, the economy and on people's lives;
- Second is how Russia's oil and gas itself lends to climate change internally and externally;
- Third is the generally legacy of inefficient energy production, transportation and consumption infrastructure, leading to higher emissions than necessary given the many potential improvements; and
- Fourth is the potential role of the country in supplying the global carbon market with emission reduction certificates.

Each of these issues will be reviewed in this report.

1.1 The impacts of climate change in Russia

According to the most recent scientific assessments Russia does show certain vulnerabilities. Climate change may affect precipitation, flooding, droughts and increase dryness in some regions (IPCC, 2007)[3]. In some parts of Russia, climate change could also significantly alter the variability of river runoff such that extremely low runoff events may occur much more frequently in the crop growing regions of the south west (Peterson et al., 2002). In addition, permafrost thawing on well-drained portions of slopes and highlands in Russia will likely improve the drainage conditions and may lead to a decrease in the groundwater content (Hinzman et al., 2003; Batima et al., 2005).

Climate change is also expected to have significant impacts on Russia's main ecosystems, given its large territory and long coast line, with consequences to key economic sectors and human development, as reported in the table below:

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[1] The Kyoto Protocol could not be enforced until it was ratified by at least 55 countries and covered at least 55% of the emission reduction targets. It finally entered into force on 16 February, 2005, following the ratification of the Protocol by Russia but without the United States.

[2] Russia faces numerous critical environmental problems which need to be tackled and are related to air quality (in urban areas caused by heating, power generation, transportation and industry), deterioration of drinking water quality massive accumulation of hazardous industrial waste and widespread degradation of land, fisheries, and forests caused by the rapid recovery in industrial production and the increasing energy needs (http://www.bio-sme-tc.net/market_aspects/russia.htm).

[3] Reference for this section is mainly the 2007 IPCC Fourth Assessment Report, Working Group II Report on climate change impacts, Chapter 10 (Asia) and 15 (Polar regions).

Table 1: Climate Change impact on ecosystems in Russia (based on Perelet et al., 2007 and IPCC, 2007)[4]

Arctic[5]	- Rising temperatures pushing the permafrost boundary further north and deepening the surface melt[6] - Rising sea level and more storm surges affecting coastal facilities - Carbon storage increases and albedo decreases - Shifts in the distribution ranges of plant and animal species (terrestrial, freshwater, and marine)
Tundra	- Many tundra areas disappearing from the mainland, except in artic Russia where bog growth prevents forest development - Shrinkage of tundra affects migratory birds
Forested tundra	- Will be covered by forests that will move towards the north
Northern taiga	- Outbursts of forest diseases expected
Middle taiga	- Conditions for agriculture will improve - Negative influence of temperature anomalies on public health expected
Southern taiga	- By the middle of the next century the forest structure will change to deciduous trees
Broad-leave forests and forested steppe	- With rising temperature the steppe zone will move northwards and forest-steppes will start replacing forests
Steppes	- Decrease in grain crop output due to droughts - Significant part of steppes in the mountain areas of Altai and Southern Siberia will be replaced by forests by 2100
Semi-deserts	- Small increase in annual precipitation - Frequency of heavy droughts will rise leading semi-deserts to expand and encroach on steppes
Deserts	- Greater climate instability and negative effects - More rain in near Caspian deserts - More drought stricken years expected with strong winds and dusty storms (Kokorin et al., 2007)

Climate change impact has already been felt in Russia (see Perelet et al., 2007), and it represent an additional stress capable of further aggravating existing environmental, economic and social issues. The following tables summarize some of the key observed changes.

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[4] These key consequences are considered likely to occur.

[5] The Russian Arctic covers about 6.2 million km^2. The Marine Russian zone in the Arctic consists of two big marine eco-regions – the Bering and Barents Seas, each with unique biota and rich but fragile ecosystems (WWF, 2007).
http://www.panda.org/about_wwf/where_we_work/project/projects/index.cfm?uProjectID=RU0127.

[6] This is likely to lead to significant damage to buildings and roads built on permafrost. On the other hand, new opportunities for oil, gas and mineral exploration in presently ice-covered waters and adjacent land areas, and transport to the market through the Arctic seas will arise.

Table 2: Recent trends in permafrost temperatures measured at different locations (based on IPCC, 2007)

Region	Permafrost temperature change/trends	Reference
East Siberia (1.6 to 3.2 m), 1960 to 1992	+0.03°C/year	Romanovsky et al., 2001
West Siberia (10 m), 1960 to 2005	+0.6°C/year	Izrael et al., 2006

Table 3: Summary of key observed past and present climate trends and variability (based on IPCC, 2007)

Changes in temperature	Changes in precipitation	References
2 to 3°C in past 90 years, more pronounced in spring and winter	Highly variable, decrease during 1951 to 1995, increase in last decade	Savelieva et al., 2000; Peterson et al., 2002; Gruza and Rankova, 2004

Table 4: Summary of observed changes in extreme events and severe climate anomalies (based on IPCC, 2007)

Key trend	Reference
Heat waves broke past 22-year record in May 2005	Shein, 2006
Intense Rains and Floods	**Reference**
Increase in heavy rains in western Russia and decrease in Siberia; increase in number of days with more than 10 mm rain; 50 to 70% increase in surface runoff in Siberia	Izrael and Anokhin, 2001; Gruza and Rankova, 2004
Droughts	**Reference**
Decreasing rain and increasing temperature by over 1°C have caused droughts; 27major droughts in 20th century have been reported	Izrael and Sirotenko, 2003

Many leading figures in the Russian scientific world working on climate change are known as climate sceptics (Moe et al., 2000 and Korpoo et al, 2007) and it is not uncommonly argued that climate change could be beneficial to the country (Kotov, 2004). In particular, some people believe that climate change is likely to lead to the opportunity for an expansion of agriculture and forestry (provided that markets and infrastructure exist or are developed).

Indeed, some studies report that some initial warming (1 °C) and CO_2 fertilization may help agriculture and human health in some areas of Russia[7], for a near term gain of 1 to 3% of GDP; but that the impacts of greater warming will become adverse worldwide over the longer term, including losses of 4 to 9% in Russia (Tol, 2001). In particular, it is reported that fertile regions like Northern Caucasus can become desert-like, dry steppes (Russian Regional Ecological Centre, undated).

[7] Gains in production due to climate change will require large investments for changing the output structure of this sector and its protection from plant diseases (Perelet et al., 2007).

Therefore, it is likely, as claimed by Izrael and Sirotenko (2003) that climate change would make it more difficult than it already is to step up the agricultural production to meet the growing demands in Russia.

Another usual claim is that climate change will shorten the period when heating is required, thus reducing fuel consumption. However, it will also increase the number of days with high and critical temperatures (so-called heat waves) causing problems for power stations' heat-absorption systems and increasing air conditioning expenses. Furthermore, an increase in the length of warm weather can have adverse effects on the population health[8].

1.2 Energy Characteristics of Russia

Although other energy and climate change issues are important in Russia, it is oil and gas that drives everything and represents the central fact of the energy politics of the country.

Russia holds the world's largest natural gas reserves[9] and the eighth largest oil reserves[10], being the world's largest exporter of natural gas, and the second largest oil exporter[11]. Russia's economy is heavily dependent on oil and natural gas exports. According to the US DOE (2008), the oil and gas sector generates more than 60% of Russia's export revenues (64% in 2007), and accounts for 30% of all foreign direct investment (FDI) in the country.

Total GHG emissions (excluding LULUCF[12]) in Russia amounted to 3,323,419.06 Gg CO_2 eq. in 1990 (the base year) and decreased by 36.0% from the base year to 2004[13], due to the steep economic decline in the 1990s[14] (UNFCCC, 2008).

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[8] The negative influence of temperature anomalies on public health has been established in Russia (Izmerov et al., 2004). Prevalence of malaria and tick-borne encephalitis has increased over time in Russia (Yasukevich and Semenov, 2004).

9 According to the Oil and Gas Journal's 2008 survey, Russia's natural gas reserves account for 1,680 trillion cubic feet (Tcf), which is nearly twice the reserves in the next largest country, Iran.

[10] According to the Oil and Gas Journal's 2008 survey, Russia has proven oil reserves of 60 billion barrels, most of which are located in Western Siberia.

[11] Currently the largest share of the EU's oil and gas imports come from Russia.

[12] Emissions from LULUCF (Land Use, Land Use Change and Forestry) activities are important as they account for approximately 30% of the anthropogenic CO_2 emissions (Watson et al., 2000). Forests also play an important role in the carbon cycle as they sequester CO_2 from the atmosphere through photosynthesis.

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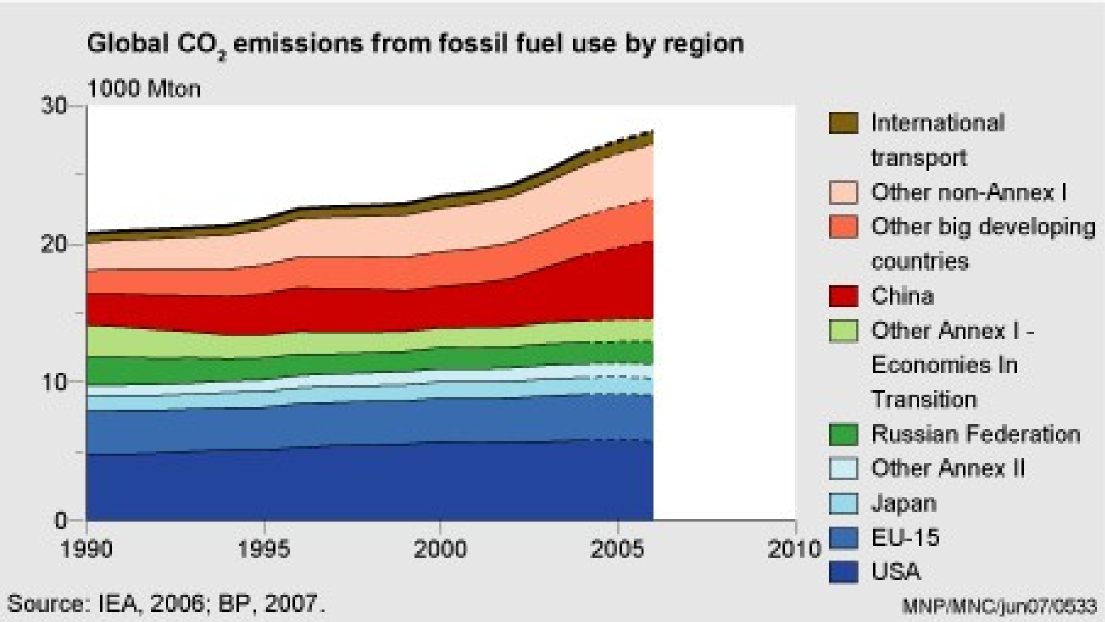
[13] This is the latest data available and is based on the initial report submitted by the Russian Federation on 20 February 2007, in accordance to Decision 13/CMP.1. The report refers to Russia's 2006 greenhouse gas (GHG) inventory submission of 8 January 2007 (national inventory report (NIR)) and 16 February 2007 (common reporting format (CRF) tables). Following the in-country review undertaken by an expert review team coordinated by the UNFCCC Secretariat, the Russian Federation submitted final revised estimates for 1990 and 2004 on 14 January 2008.

[14] Russia counted on the collapse of the old Soviet economy in the 1990s when it negotiated its target under the Kyoto Protocol. As a result, Russia is entitled to an enormous surplus of emission reduction credits under Kyoto. Known has 'hot air', the resulting credits were accumulating because industrial emissions are far less than they were in the base year 1990. While these emission reductions are real, many consider them to be illegitimate because of the manner by which they were attained.

Russia's commitment under the Kyoto Protocol is to ensure that average emissions in 2008-2012 do not exceed its emissions at the 1990 level, which would leave a substantial part of assigned amount available for transfer to other Annex I Parties and make the country a potential net seller.

Russia is currently the third largest energy consumer and is also the world's third largest emitter of greenhouse gases in absolute terms[15], accounting for a share of around 6.2% of the global GHG emissions in 2004, according to EIA (2007). Total fossil CO_2 emissions are reported in the figure below for different regions and include Russia:

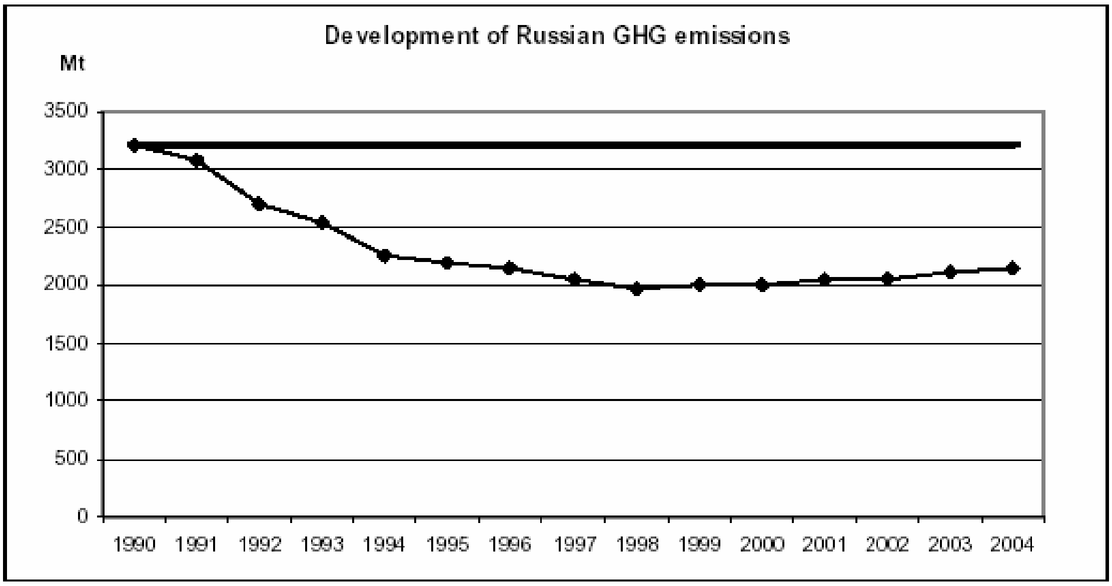
Figure 1: Global CO_2 emissions from fossil fuel by region (IEA, 2006; BP, 2007)



GHG emissions in Russia have shown an increase over the last years due to economic growth, and spurred by energy and commodity prices. However, it is expected that if current trends continue, Russia's share in the global GHG emissions will not significantly change (Perelet et al., 2007).

[15] www.unfccc.int

Figure 2: Development of Russian GHG emissions in 1990-2004 (Russia Federation, 2006)



Due to the improving living standard of the population, the consumption of electricity is increasing in Russia. Thermal power (oil, natural gas, and coal-fired) accounts for roughly 63% of Russia's electricity generation, followed by hydropower (21%) and nuclear (16%) (EIA's International Electricity data). Since generation capacity is fully utilized, the increased demand will likely be met by one or more of the following options:

- Reintroduction of old inefficient electricity generation capacity which was closed when the electricity consumption collapsed (Climate Strategies, 2008);
- Increase coal production and build additional coal-fired plants[16]. There have been calls for a large scale replacement of gas by the more carbon intensive coal in the power generation in the longer term, which would help reducing demand for natural gas, thus allowing for more natural gas exports (US DOE, 2008);
- Investment in nuclear stations[17]; and/or
- Making hydroelectric generation a priority. This has been envisaged particularly in the country's Far East, where provision and delivery of electricity supply can be problematic (US DOE, 2008).

[16] Russia holds the second largest coal reserves, with 173 billion short tons (US DOE, 2008).

[17] Russia has an installed nuclear capacity of 21.2 million kilowatts, distributed across 31 operational nuclear reactors at 10 locations, all west of the Ural Mountains. However, Russia's nuclear power facilities are aging. Roughly half of the country's 31 nuclear reactors use the RBMK design employed in Ukraine's ill-fated Chernobyl plant. The working life of a reactor is considered to be 30 years: nine of Russia's plants are between 26 and 30 years old, and six are between 21 and 25 years old. Investment in the nuclear sector is expected to double to $960 million in 2008. Gazprom has also expressed interest in building nuclear stations to free up natural gas for export (US DOE, 2008).

Depending on the strategy adopted, there could be a further increase of GHG emissions in the country. This could have severe implications and threaten the country's engagement in a dialogue on post-2012 climate change regime, as according to some Russian experts the role of the country could turn from a seller to a buyer of carbon credits soon after the end of the first commitment period should the positive trend of economic development continue (Korppoo et al., 2007).

Russia does not have a clear position concerning the post-2012 negotiations. However, Russia submitted to the UNFCCC a proposal to allow for voluntary commitments by countries to reduce or limit their GHG emissions[18]. Currently, developing countries wishing to take on commitments face cumbersome bureaucratic procedures and multiple obstacles and uncertainties. The Russian suggestion is to urgently launch a procedure for adoption of voluntary commitments, which could become an element of a new agreement and remove barriers for countries willing to make further contributions to the reduction of the anthropogenic impact on the climate. The main principle of voluntary commitments is no-regret emission reduction measures by countries and incentives could include for instance participation in emissions trading, receiving funding for adaptation, etc.

[18] The Russian Proposal was first launched at COP/MOP-1 in December 2005 (FCCC/KP/CMP/2005/L.8/Rev.1). Parties were officially invited to submit their views on the Russian proposal by August 2007 to be considered in COP-13 in Bali. The proposal is currently under discussion.

2 MAJOR OPTIONS FOR CLIMATE CHANGE MITIGATION IN RUSSIA

There is a vast potential for efficiency enhancements and GHG reductions in Russia, mainly in the fields of energy generation and industrial energy use. Although Russia's carbon intensity (level of GHG emissions per unit of GDP) has been significantly lowered from 1999 to 2003 (Perelet et al., 2007), it still exceeds by far the leading EU countries.

Overall, it is recognised that by optimising the Russian production and transport gas system, it could be possible to reduce the current emission level by a remarkable 30-60% (Dienst, 2006).

A lot of speculation exists about the leakages occurring in the Russia's natural gas industry. Dienst (2006) reports that 2/3 of the total GHG fugitive emissions are CO_2 emissions from machines and valves at compressor stations, while methane losses from leakages would account for approximately 0.7% of the gas arriving at the Russian Western border[19]. Many cost-effective emission-reduction practices have been suggested, such as the installation of flare systems and green completions at wells, the replacement of high bleed pneumatics with low bleed systems, the introduction of directed inspection and maintenance at compressor stations (Fernandez et al., 2004). In addition, reinvestment is needed in order to replace old compressors that are still in current operation.

Significant climate change mitigation benefits could also be achieved in Russia through gas flaring reduction. Flaring and venting of associated gas (a blend of different hydrocarbons) that is carried out to dispose of unwanted associated gas, also contribute significantly to the global GHG emissions, besides wasting a valuable resource that could be used productively[20]. Russia has been flaring by far the greatest amount globally (US National Oceanic and Atmospheric Administration, 2006). Rostekhadzor, a government agency, has introduced legislation to increase fines for associated flaring above 15% of the total associated gas output from January 2009. Russia's current limit for gas flaring is 25% of the total gas output, and penalties are small. The government would like to reduce flaring by 5% by 2011 (US DOE, 2008).

2.1 Renewable energy potential

Russia has a substantial renewable energy potential which includes diverse renewable energy sources and practically all regions have at least one or two forms of renewable energy that are commercially exploitable.

Russian experts estimate that the amount of renewable energy that is economically recoverable is more than 270 million tons of coal equivalent (Mtce) per year, as reported in the table below, including 115 Mtce/y of geothermal energy, 65 Mtce/y of small hydropower, 35 Mtce/y of biomass, 12.5 Mtce/y of solar, 10 Mtce/y of wind and 31.5 Mtce/y of low potential heat (Kargiev et al., 2004; IEA, 2003; and Bezrukikh et al., 2002).

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[19] Most of Russia's methane comes from natural gas and oil systems. Russia is a member of the Methane to Markets Partnership initiated in November 2004 by the US Bush Administration to focus on promoting cost-effective recovery and use of methane.

[20] Historically, producers have simply burned gas found alongside oil if it was too difficult and costly to recover and sell it.

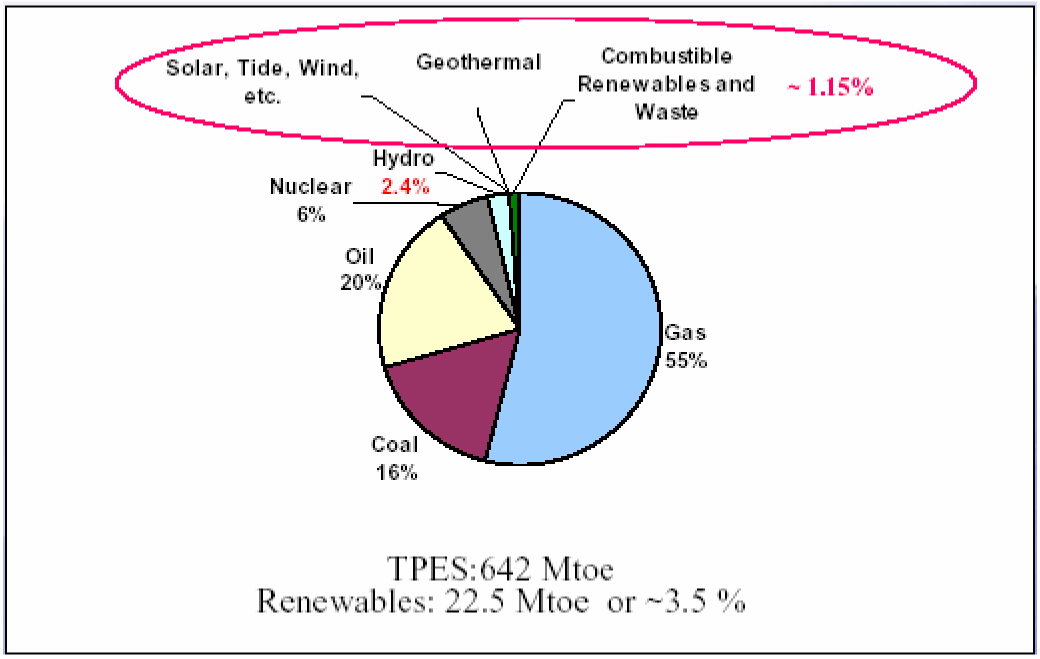
These estimates of renewable energy potential have not been updated since 1993, and do not consider the more recent evolution of the economic situation in Russia, as noted by IEA (2003). According to the new Energy Strategy of Russia, adopted in May 2003, the economic potential of renewables has grown significantly in recent years because the prices for fossil fuels have increased while the cost of renewable energy technologies has dropped[21].

Table 5: Renewable energy sources in Russia (million tons of coal equivalent per year) (Kargiev et al., 2004)

Resources	Gross Potential	Technical Potential	Economic Potential
Hydro, bln kWh	-	-	852
Small Hydro	360	125	65
Geothermal Energy	-	-	115
Biomass Energy	$10x10^3$	53	35
Wind Energy	$26x10^3$	2000	10
Solar Energy	$2,3x10^6$	2300	12,5
Low Potential Heat	525	105	31,5
Total RES (excluding Large Hydro)	$2,3x10^6$	4583	270

However, this potential is largely unrealised due to lack of political and regulatory support and lack of economic incentives. In 2001 the renewable energy sources (RES) share in the national energy balance accounted for 3.5% of which two-thirds was hydro and one-third all other forms. The figures from 2004 have remained the same as reported below:

Figure 3: Renawables in Russias's TPES (Total Primary Energy Supply) in 2004 (Beral, 2007)



21 Ministry of Fuel and Energy, Energy Strategy of Russia until 2020, Moscow, Approved 22 May 2003.

Some positive development may be observed regarding RES share in total power generation which amounted to 0.5% (excluding large hydro) in 2001 and increased to 0.9% in 2005 (Beral, 2007).

2.1.1 Solar

Solar energy potential is greatest in the south-west (North Caucasus, the Black and Caspian Sea regions) and in Southern Siberia and the Far East accounting for 1,400 kWh/m^2 per year. The Federal Target Program 'Energy Efficient Economy' plans to construct and install several photovoltaic units with total capacity of 2,136 MW that will produce 3.77 million kWh of electricity up to 2010 (Kargiev et al., 2004). However, it is reported by Beral (2007) that this national programme is under-funded in practice.

2.1.2 Wind

There are numerous areas where the annual mean wind speed exceeds 6.0 metres per second (m/s), particularly along the coasts of the Barents and Kara seas, the Bering Sea and the Sea of Okhotsk. According to the Federal Program "Energy Efficient Economy", Russia plans to install by 2010 228 MW of wind capacity for generating 570 million kWh(e) (Kargiev et al., 2004). Currently installed capacity amounts though to 14 MW (Beral, 2007).

2.1.3 Small Hydro

Small hydro is the most mature field of renewable energy. The potential of smaller rivers amounts to about 46% of total hydro energy potential. Most of the potential hydropower resources are located in Central and Eastern Siberia and in the Far East. The North Caucasus and the western part of the Urals also have good hydropower potential (Kargiev et al., 2004). Installed capacity amounts to 1,000 MW (Beral, 2007).

2.1.4 Biomass

Russia has rather great potential for wide-scale and effective use of biomass resources and biomass is perceived as one of the most suitable solutions for power production and for cogeneration of heat and electricity. In particular, district heating systems have arisen as a potential niche market for biomass. Installed capacity so far accounts for 1,270 MW (Beral, 2007).

2.1.5 Geothermal

Geothermal energy may be effectively used for heat supply of cities, settlements and stand alone complexes on 75-80% of the total Russian territory. Taking into account the fact that Russia has a lot of geothermal resources, there are projects under development for using low-temperature thermal energy for heating residential houses and production facilities. Geothermal installed capacity accounts for 73 MW (Beral, 2007).

Despite the referred significant potential, the main obstacles to the development of renewable energy in Russia are:

- The large availability and historical reliance on hydrocarbons (at low domestic prices until recently) and legacy of nuclear energy;
- Lack of legislation that specifically addresses the development of renewable energy. The Energy Strategy of Russia for 2020, released in August 2003, called for an increase in the share of renewable energy and included a provision requiring the necessity of passing a new law concerning the development and utilization of renewable energy sources. However, the strategy itself it devotes only 3 of its 118 pages to renewable sources and a draft law "On Renewable Sources of Energy" has not yet been adopted; and

- Lack of financial incentives, such as taxation, subsidies, or quotas capable to influence market behaviour[22].

2.2 Sinks as a mitigation strategy

Both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol recognize the important role of forests for mitigating climate change. However, whether and how sequestering of carbon should be accepted as meeting emission reduction commitments has long been a source of contention, due to scientific uncertainties and arguable linkages to deforestation.

The Bonn Agreement reached in 2001 at the Sixth Conference of the Parties to the UNFCCC (COP-6) allowed countries to meet part of their Kyoto targets through four types of land use, land use change and forestry (LULUCF) activities: forest management, cropland management, grazing land management, and re-vegetation. These activities, commonly referred to as "sinks" activities, absorb carbon from the atmosphere and fix it in plants, soil and other organic matter. Each developed country was allocated a number of tons of carbon uptake that it could count towards its emissions target from forest management activities.

After the US withdrawal from the Kyoto Protocol in 2001, Russia's bargaining power in the negotiations increased substantially, given its fundamental role for Kyoto's entry into force, due to its large share of 1990 emissions. As a result, before COP-7, Russia was able to exploit this increased bargaining power by contesting the amount it was allocated in Bonn for forest management. Russia asked that the amount be nearly doubled from 17.6 million tons of carbon (MtC) to 33MtC (as forest and other wooded lands cover more than half of Russia's land area) and it held up the conclusion of the meeting until it received its full demand.

Statistics from FAO[23] suggest that afforestation and reforestation are unlikely to play a major role in Russia's national GHG inventory as there is little deliberate expansion of Russia's plantation forests. It appears that greater opportunities arise instead from forest management. Net uptake due to forest management activities as defined under Article 3.4 (basically net forest growth) is estimated to be 117.5 MtC/y according to the Russian Government submission to the UNFCCC and up to 425 MtC/y according to FAO statistics (Bosquet et al., undated).

But in order for the LULUCF sector to be taken into account, a sinks inventory and a report on activities under Articles 3.3 and 3.4. of the Kyoto Protocol are submitted. The sinks inventory will be reviewed by international teams, and if found not to be of sufficient "quality" as defined by IPCC guidance on best practice, the country will not be eligible to use the mechanisms.

As a whole, the Russia's LULUCF sector was estimated to be a potential net source in 1990. However, the review of the country's initial inventory for years 1990-2004 submitted in 2007 concluded that due to the lack of proper data, Russia did not report emission estimates from deforestation. Therefore, no emissions from the LULUCF sector were accounted for in the calculation of the assigned amount.

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[22] A number of international and multilateral institutions provide financial assistance to clean energy and energy-efficiency projects in Russia. A few of the most prominent are the EU-Russia Technology Centre, the Global Environmental Facility (GEF), the International Finance Corporation (IFC), the Nordic Environment Finance Corporation (NEFCO), The Norwegian Barents Secretariat and The Renewable Energy and Energy Efficiency Partnership (REEP).

[23] See the FAO's statistics at http://www.fao.org/forestry/fo/country/index.jsp?lang_id=1&geo_id=166

In addition, Russia did not report in its inventory definitions for the various forest land and land-use change categories, as required by the IPCC good practice guidance for LULUCF (UNFCCC, 2008).

This means that unless Russia improves the quality of data contained in its inventory and manages to properly follow the IPCC good practice guidance for LULUCF, it will not be able to claim the credits it bargained for at COP-7 in Marrakech.

2.3 Kyoto Flexible Mechanisms

The entry into force of the Kyoto Protocol (KP) started up a vibrant carbon market. The so-called 'flexible mechanisms' included in the KP allow Annex I countries (those developed countries that were members of the Organization for Economic Co-operation and Development (OECD) in 1992) to cooperate with other countries to achieve their emission targets at the least possible cost. Developed countries can thus cut emissions where it is the cheapest to do so, as the impact on the global atmosphere remains the same.

For Russia, the KP flexible mechanisms, Joint Implementation (JI) and International Emission Trading (IET) in particular, constitute promising opportunities for improving energy efficiency and promoting renewable energy sources, as explained below.

2.3.1 Joint Implementation (JI)

Russia published in May 2007 the long waited procedure for approving JI projects. The basic steps for submitting a project are prescribed in the Governmental Order No. 332 (Russian Government, 2007). However, the finalization of the institutional infrastructure was completed only in January 2008.

Projects that reduce GHG emissions such as fuel switching from coal-to-biomass, energy efficiency, or renewable energy may qualify for JI in Russia under the Kyoto Protocol provided the eligibility criteria are met. Under JI an investing country buys carbon credits to meet its Kyoto targets, by making investment in emission-reducing projects in a host country. Russia has a great potential to host JI projects based on cost efficient GHG reduction, large potential for energy efficiency, and lack of renewable energy initiatives and support mechanisms.

Russia has started to approve JI projects under the "track 2" approach[24]. Under this approach, independent validators determine the conformity of projects with JI requirements and the JI Supervisory Committee is responsible for the verification of projects. It results from the analysis of the JI project portfolio that gas pipeline projects reducing the emissions of methane caused by leaks of natural gas from the low pressure pipelines dominate the portfolio, while energy efficiency projects are addressed only to a limited extent. This is partially justified by the global warming potential of methane (21 times more potent compared to CO_2) which increases the profitability of the project, and by the low cost of emission reductions (Korppoo et al., 2008).

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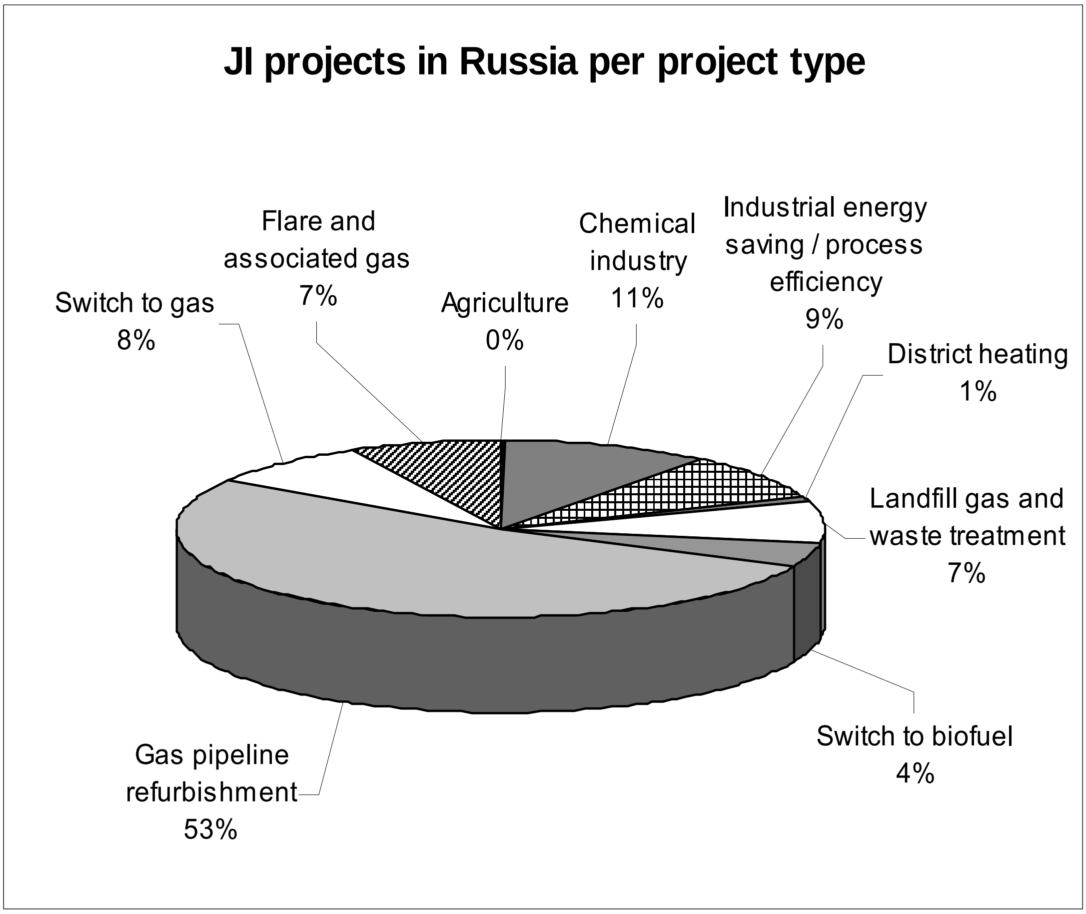
[24] Track 1 approach applies to countries that meet all the eligibility requirements for JI projects set by the UNFCCC. It differs from Track 2 as countries can apply their own national rules and procedures to approve projects and estimate emission reductions.

Figure 1: Project portfolio by end January 2008 (Korppoo and Moe, 2008)



The JI approval procedure adopted by Russia seems to focus on controlling rather than attracting projects. This, in addition to the institutional delay, has resulted in a lower number of projects submitted than expected. However, by June 2008 Russian share of JI projects submitted to the UNFCCC is above 50% by number of projects, confirming the leading role of the country in the JI process as a whole. Total volume of ERUs to be transferred is about 170 Mt CO_2eq, including 60 Mt CO_2eq from 5 large projects, 31 of 1-6 Mt CO_2eq projects and 41 relatively small projects in 43 Russian Regions. No crediting can be issued for emission reductions taking place before 2008.

2.3.2 Emissions Trading (ET)

Under the Kyoto Protocol, ET refers to the transfer of emission allowances ("assigned amount units" or AAUs) between developing countries or legal entities authorized by them. Russia is potentially a net seller of AAUs and it is estimated that it will have a surplus of around 3.1 billion tonnes of carbon dioxide equivalent (CO_2eq) (ICF, 2006). However, the role that this so-called "hot air" will play in the first commitment period (2008–12) is likely to be crucial for the Kyoto carbon market.

Some countries, such as Germany, the Netherlands and Austria, have emphasized that they will not purchase "hot air" if not linked to some global or local environmental benefits. Also, several environmental NGOs in both seller and buyer countries strongly oppose the idea of the trading of surplus AAUs without any so-called "greening".

The negative perception that surrounds the transfer of these surplus AAUs is also present in the academic environment:

> "...completely an artifact of the luck and skill of the diplomats in Kyoto rather than the result of any effort to control emissions (...) no Western legislature will ratify *a deal that merely enriches Russia and Ukraine while doing nothing* to control emissions..." (Victor 2001)

The Russian perception is however quite different. Rather than seeing this surplus of emission allowances as illegitimate, they consider the way their "headroom" allowances have been denigrated as "hot air" quite offensive.

Green Investment Schemes (GIS) may play an important role in this context. Under such proposed schemes, the revenues from the sale of surplus AAUs would be reinvested in environmental projects/activities in the seller country. The concept was born in Russia during the ratification discussions and is now strongly supported by the World Bank, among others. Such schemes may take a number of different forms and are thus more flexible than JI projects because they are not subject to the rules and procedures of the UNFCCC and the Marrakech Accords (Tangen et al., 2002; Blyth et al., 2003).

However, in order to participate in international emission trading, Russia has to meet several requirements, including providing national inventory and reporting and establishing a national registry compatible with the international standards. The Russian Federation has only established the necessary formal procedures for the national system very recently, and it is not yet clear whether the formal procedures will work effectively, that all necessary data and information will be provided to the inventory agency and that all formal procedures will be implemented on a regular basis (UNFCCC, 2008).

3 CLIMATE CHANGE AND ENERGY EFFICIENCY WITHIN THE GENERAL FRAMEWORK OF EU COOPERATION WITH RUSSIA

As almost a third of the EU's gas and a quarter of its oil come from Russia, it is not surprising that the EU has been looking for a way to build a more transparent and predictable energy relationship with Russia.

The current legal and political framework of EU relations with Russia is the Partnership and Cooperation Agreement (PCA)[25] – the basis upon which all other approaches have been based. The PCA, which dates from 1997, establishes a legal, institutional, political, economic, and administrative framework to facilitate bilateral relations between Russia and the EU in all areas of cooperation. Article 56 of the Agreement provides that economic cooperation between the Parties "shall be guided by the requirements of sustainability" and "shall also fully incorporate environmental considerations". Energy cooperation, which, according to Article 65, shall take place "against a background of the progressive integration of the energy markets in Europe", shall aim *inter alia* at "promotion of energy saving and energy efficiency" and at addressing "the environmental impact of energy production, supply and consumption, in order to prevent or minimize the environmental damage resulting from these activities". Combating global climate change and protecting forests are specifically mentioned among the objectives of bilateral environmental cooperation set out in Article 69 of the PCA.

One of the major results of the EU-Russia Summit held in Paris in October 2000 was a decision to establish an "energy dialogue", aimed at increasing mutually beneficial cooperation in the energy area, including issues related to sustainability and continued reliability of the production, distribution, transportation, and efficient use of energy[26]. The dialogue was launched in the context of increasing energy prices and the preparation of the Commission's Green Paper on energy security. One of the outcomes of the energy dialogue was the development of the joint Energy Dialogue Technology Centre which was built in Moscow in 2002[27].

Within the framework of the Russia-EU energy dialogue, the following actions have been implemented according to the final report of the Thematic Group on energy efficiency[28]:

- Seminar on ESCOs and Gas Flaring held in October 2006;
- Conference held in December 2006 on EU and Russian energy efficiency centres and agencies;
- Energy efficiency actions focusing on regional needs funded by the Tacis programme in three Russian pilot regions (Kaliningrad, Arkhangelsk and Astrakhan);

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[25] Decision 97/800/EC of 30 October 1997, OJ L 327 of 28.11.1997.

[26] The EU-Russia energy dialogue was launched on the initiative of Presidents Chirac and Putin and the then-Commission President Prodi, in the recognition that Russia and the EU are natural partners with mutual interests in the energy sector and continental energy security.
http://ec.europa.eu/energy/russia/index_en.htm

[27] http://www.technologycentre.org/

[28] http://ec.europa.eu/energy/russia/reference_texts/doc/2006_10_energy_efficiency_en.pdf

- Expert advice on how to improve regulation in Russia to promote investments in small hydro-power projects.

However, the "energy dialogue" partnership is often considered hollow and flawed, and too few of its plans come to fruition. Few significant results were produced so far mainly because the partnership was based in the assumption that Russia would progressively liberalise its energy markets[29]. But the two sides have differing interpretations of the relationship and their priorities: while Russia seeks support to modernise its energy sector and protect itself, the EU wants Russia to reform and open up its market by creating a more positive business climate (Monaghan et al., 2006).

Interested in creating a common energy space based on international law, the EU has been trying to persuade Russia to ratify the Energy Charter Treaty (ECT)[30], which adopts principles of liberal international rules for trade and investment in the oil and gas sector, and its Transit Protocol – a consequence of which would be the opening up of access to Gazprom's pipelines. The EU was expecting that Russia would at least adopt some of the principles of the Energy Charter Treaty in return for a free trade agreement with the EU. However, Russia has shown little interest in improving access to the EU market, as three-quarters of its exports to the EU consist of raw materials, which are marginally affected by trade rules (Barysch, 2007).

The EU is interested in the Russian energy market reforms for several reasons. First, the EU argues that the energy prices applied in Russia (below their world market levels) give Russian exporters an unfair advantage, notably in energy-intensive sectors. Second, there is a growing mismatch between the EU's own efforts to liberalise its energy markets and the supply of Russian gas through Gazprom's monopoly. Third, the EU is concerned about the lack of investment in infrastructure in Russia, which could lead to a disruption of supply to the EU.

In practice the PCA has become outdated in recent years since both actors have experienced significant change. In November 2007 the current PCA came to an end and was automatically prolonged[31]. The EU-Russia summit which took place on 26-27 June 2008 in Khanty-Mansiysk was concluded with a joint statement announcing the launch of official talks on a new EU-Russia strategic agreement to replace the current PCA, which will remain in force until the new one is ratified[32].

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[29] Instead, it is estimated that more than half of Russia's oil production is currently under state control (Barysch, 2007).

[30] Russia signed the ECT in 1994. At that time it was designed to regulate supplies amid the general uncertainty that existed in the post-Soviet area. The Charter has failed to become a full-fledged global agreement, since the Middle East and North American countries failed to endorse it. In Asia, it was only ratified by the Central Asian states, Mongolia, and Japan (Milov, 2007).

[31] Since Russia is still not a member of the World Trade Organisation (WTO), a considerable gap in trade relations would be created if the PCA was eliminated, given that its main part deals with trade between the parties. Bilateral EU-Russia negotiations for Russia's accession to the WTO were concluded in 2004, at the time when Russia also agreed to ratify the Kyoto Protocol, but further negotiations at multilateral level are still ongoing.

[32] Joint statement of the EU-Russia summit on the launch of negotiations for a new EU-Russia agreement, Khanty-Mansiysk, 27 June 2008, Council Press Release 11214/08, http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/er/101524.pdf

The new agreement is intended to provide what the statement describes as "a comprehensive framework for EU/Russia relations", covering all main areas of the bilateral relationship. On 4 July 2008, the negotiators from the European Commission and Russia met in Brussels for the first round of talks on the new agreement. The meeting focused mainly on defining the overall scope of negotiations, the agenda for the different areas to be covered, and establishing a calendar for the negotiations[33]. However, Barysch (2007) estimates that even barring setbacks, it could take five years to complete this new treaty and have it ratified by all EU countries.

[33] 'EU-Russia: first round of negotiations for the new Agreement', Commission Press Release IP/08/1099, 3 July 2008, http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1099&format=HTML&aged=0&language=EN&guiLanguage=en

4 ENHANCING EU-RUSSIA COOPERATION ON CLIMATE CHANGE: SUGGESTED ELEMENTS FOR DISCUSSION

As negotiations on a new EU-Russia agreement are beginning, it is important that the EU seek to engage Russian attention on climate change policy issues. Energy will inevitably remain at the core of the EU-Russia relationship, but it is important that the issue of climate change is placed equally high on the agenda. The EU has an opportunity to ensure that provisions are included in the new treaty, which are strong enough to strengthen the EU-Russia cooperation on fighting climate change[34].

One of the instruments for strengthening bilateral cooperation in the field of climate change and environmental protection more generally which could be considered in the framework of those negotiations is the establishment of a joint Green Investment Scheme (GIS). As mentioned above, this instrument has already been explored by several authors (Tangen et al., 2002; Blyth et al., 2003), but has not yet materialized. A GIS could be envisaged as a source of funding to support the implementation of environmental commitments agreed by Russia at international level. Funding for the GIS could be provided jointly by Russia and EU on terms to be agreed. The GIS could build on the existing dialogues between the EU and Russia related to climate policy, deepening relationship between the two sides, and facilitating the implementation of concrete mitigation and adaptation projects.

In addition to the above mentioned framework of cooperation, the EU could use other existing multilateral and sub-regional forums to engage Russia in addressing issues related to the mitigation and adaptation of climate change, such as the ones mentioned below.

- **Arctic area:** The **Northern Dimension Policy** is characterized as the regional expression in the north of the EU/Russia Common Spaces. One of the most striking achievements of the Northern Dimension is that it succeeds in involving Russia in concrete cooperation projects, on a non-political basis. The main implementation instrument is the partnership model. This should be extended to other areas such as energy and transport.
- **Baltic area:** Both the European Community and Russia are members of the **Convention on the Protection of the Marine Environment of the Baltic Sea Area.** This intergovernmental cooperation agreement aims at protecting the marine environment of the Baltic Sea from all sources of pollution and environmental interference. Given the tremendous impact of climate change in the Baltic Sea (HELCOM, 2006), this forum could be used by the EU and its Member States to further engage with Russia on climate change issues at this subregional level.

[34] This could be achieved through a sectoral agreement negotiated under the framework of the new treaty. The Commission has stated in the past that, whether a new agreement would replace the PCA, and without prejudice to the decision on whether it would be a contractual agreement or a political declaration, "in either case the framework would be complemented by a series of sectoral agreements which would be legally binding". ('The EU-Russia PCA – Content of a New Framework for Relations', Commission - Meeting Document 025/06, Eastern Europe and Central Asia, 26.01.2006).

- **Black Sea area:** According to the most recent scientific assessments climate change may affect storminess, sea level rise, water availability, droughts, and flooding in the Black Sea (IPCC, 2007). The German Advisory Council on Global Change (WBGU) adds that the Black Sea region is likely to experience a decline in food production and environmentally-induced migration due to climate change. Adapting to climate change and avoiding the worst of the impacts will require successful management and administration, as much as appropriate techniques.

  The following frameworks could be used by the EU and its Member States to enhance cooperation with Russia in the region:

  - **the Black Sea Convention**[35] was established in 1992. As a regional sea convention, it is the only legal structure responsible for protecting the Black Sea environment. However, its institutional setting should be reviewed in order to integrate best practices and open the Convention to accession by regional organizations such as the EU.
  - the **Black Sea Synergy**, a regional cooperation initiative of the EU aiming at developing a clearer focus on alternative energy sources and on energy efficiency and energy savings (COM(2007) 160 final). Russia is listed as one of the focus countries, in addition to Greece, Bulgaria, Romania, Moldova, Ukraine, Georgia, Armenia, Azerbaijan and Turkey.
  - **the Baku Initiative**, a policy dialogue aimed at enhancing energy cooperation between the EU and countries of the Black Sea, the Caspian Basin and their neighbours. Includes Armenia, Azerbaijan, Belarus, Georgia, Iran, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan. Russia participates as an observer.
  - **BSEC (Black Sea Economic Cooperation Organisation)**, an international forum aimed at building confidence for the discussion of common interests. Russia and Turkey are BSEC's founding members. Seven EU Member States have observer status with BSEC and the Commission intends to seek observer status and to support EU Member States' applications.

These forums allow for additional forms of cooperation outside the politically charged framework of the PCA and its intended successor agreement and the EU could make better use of them to further involve Russia in the climate change debate and enhance relevant cooperation in these subregional settings. Focusing on these technical forums, which include the participation of other countries, could help achieving Russia's further engagement.

[35] The Convention on the Protection of the Black Sea against Pollution (the Bucharest Convention), was signed in 1992 by the six littoral countries. The Black Sea Strategic Action Plan (BSSAP) was agreed in 1996 following completion of a trans-border diagnostic analysis. It contains some 59 specific commitments regarding quality standards, measures to reduce pollution and financing of environmental projects. Implementation of the Plan is to be carried out by each of the six riparian countries via national plans.

ACRONYMS

AAU	Assigned Amount Unit
BSEC	Black Sea Economic Cooperation Organisation
BSSAP	Black Sea Strategic Action Plan
COP	Conference of the Parties
COP/MOP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
ECT	Energy Charter Treaty
ERU	Emission Reduction Unit
ESCO	Energy Service Company
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
GDP	Gross Domestic Production
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GIS	Green Investment Scheme
IET	International Emission Trading
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KP	Kyoto Protocol
LULUCF	Land Use, Land Use Change and Forestry
NEFCO	Nordic Environment Finance Corporation
OECD	Organization for Economic Cooperation and Development
OPEC	Organisation for Petroleum Exporting Countries
PCA	Partnership and Cooperation Agreement
REEP	Renewable Energy and Energy Efficiency Partnership
RES	Renewable Energy Source
TPES	Total Primary Energy Supply
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organisation

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