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Abstract: The purpose of this paper is to gain a broad overview and better understanding of the current and future policies, market trends, prospects and barriers related to Foreign Direct Investment (FDI) in energy efficiency and carbon mitigation in the Russian energy industry. The analysis was conducted by reviewing the relevant scientific and non-scientific literature, and focuses on a variety of theoretical and practice-oriented arguments. In this context, we assess the progress and future potential of Joint Implementation (JI) and the Green Investment Scheme (GIS) as two possible channels for FDI in transnational projects aiming at carbon mitigation and increases in energy efficiency. Based on this assessment, we presume that an Energy Service Company (ESCO), as an important intermediary, can be a well-suited entity for the implementation of the market-oriented mechanisms JI and GIS in Russia in the long term. The compatibility of the main features of JI and GIS with the working procedures under the ESCO model can generate numerous synergy effects and deliver an effective vehicle for overcoming the majority of transaction barriers specific for the Russian energy market. A possibility to overcome these barriers would assist the modernization of the Russian energy industry and improve a "win-win" situation for foreign companies seeking to invest strategically in energy efficiency and carbon mitigation projects.

Keywords: Energy efficiency, carbon mitigation, Joint Implementation (JI), Green Investment Scheme (GIS), Energy Service Company (ESCO)

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1 Introduction

Security of energy supply[1] and climate change mitigation have become central concerns for the generation and maintenance of wealth and also to key ingredients of sustainable development. The immediate threats for energy supply security have been caused, however, not only by dwindling low-cost global energy resources, but also by a lack of investment and capital where it is needed: for the right projects, at the right time, and in the right place. Furthermore, unstable legal and economic conditions in different markets impede the realization of long-term energy efficiency and carbon mitigation projects. These factors account for the fact that much of the world's energy is not produced and consumed in an environmentally, economically and socially sustainable manner (UNCED, 1992).

The phenomenon described can be exemplified for the Russian Federation. Russia remains the third-largest contributor to global CO_2 emissions, after the U.S. and China (UNFCCC, 2008)[2]. Its huge wastage of energy resources due to low efficiency, among others in the energy industry, and a rapidly growing domestic demand for energy, could lead to a situation of energy scarcity for both domestic use and export, and huge environmental pollution problems. Due to the long-term energy-economic interdependencies between Russia and Europe[3], this situation increasingly alarms European authorities and businesses and motivates the introduction of numerous models and mechanisms to combat the problematique of inefficient use of energy and large carbon emissions on the transnational level. However, foreign companies seeking to profit from the transfer of energy efficiency and carbon mitigation technologies and related services in Russia are faced with two issues: on the one hand, Russia offers enormous opportunities for the implementation of foreign technologies and related business models. On the other hand, numerous risks and barriers turn off many foreign enterprises from doing business in the Russian energy sector.

In this paper, two mechanisms as possible forms of channeling FDI into transnational projects, aimed at the increase of energy efficiency and carbon mitigation in the Russian energy sector, are investigated in detail. First, *Joint Implementation (JI)* - one of the Kyoto Protocol's market-based mechanisms that allows a country with an emission reduction or

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[1] Security of energy supply is commonly defined as a reliable and adequate uninterrupted supply of energy at reasonable prices that meets the needs of the economy (Belecki, 2002).

[2] Russia accounted for around 6.2% of the global GHG emissions in 2004 (UNFCCC, 2008).

[3] Russia delivers almost one third of the European Union's gas and a quarter of its oil needs (EIA, 2007).

limitation commitment (Annex B country)[4] to earn Emission Reduction Units (ERUs)[5] from the investment in an emission reduction project in another Annex B country. JI assures the environmental integrity of the Kyoto Protocol and offers participating parties a flexible and cost-efficient way to meet their binding commitments by providing FDI and technology transfer into the host country (Kyoto Protocol, 1998). Second, the *Green Investment Scheme (GIS)*[6] – a mechanism that allows investing the revenues from selling excess Assigned Amount Units (AAUs)[7], the so-called trading currency of International Emissions Trading (IET)[8] under Article 17 of the Kyoto Protocol, in environmental improvement activities in the selling nation (Blyth and Baron, 2003). Surplus AAUs are also referred to as "hot air", as this huge amount of unused pollution credits is a result of the economic collapse after the end of the Soviet Union in countries in transition (cf. section 3.2 below). Nowadays, GIS is also increasingly considered as a possible financing instrument for energy efficiency projects (Ürge-Vorsatz et al., 2007).

Especially in Russia, the timely implementation of the JI and GIS mechanisms with the participation of the domestic and foreign investors was expected to bring numerous economic and environmental benefits (Evans, 2000; Tangen et al., 2002; Blyth and Baron, 2003; Kokorin, 2003; Karas, 2004; Laroui et al., 2004; Korppoo, 2005; Korppoo and Gassan-zade, 2008; Scharmina et al., 2009; Tuerk et al., 2010). However, to date there is insufficient progress regarding the implementation of these mechanisms in spite of the high energy and carbon intensity of the Russian energy sector. Many transaction barriers specific for the Russian energy market and uncertainties about the future climate change policies strongly impede the accomplishment and channeling of FDI into energy efficiency and carbon mitigation projects (Martinot, 1998; Painuly et al., 2003; Locatelli, 2006; Avato and Coony,

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[4] Annex B countries are countries that committed themselves to greenhouse gas emission reductions, including emissions-capped industrialized countries and economies in transition (Kyoto Protocol, 1998, p.20).

[5] 1 ERU represents an emission reduction equal to 1 ton of CO_2.

[6] The concept was initiated in Russia back in 2000 during the ratification phase of the Kyoto Protocol and is now strongly supported by the World Bank (Blyth and Baron, 2003).

[7] Assigned Amount Units (AAUs) are the units used to define Emission Allowances assigned under the Kyoto Protocol. An industrialized country is permitted to emit over a certain commitment period these allowances, which represent the anthropogenic GHG emissions. 1 AAU is the equivalent of 1 ton of CO_2 (definition by EEX, 2010).

[8] International Emissions Trading (IET) is one of the Kyoto Protocol's market-based (so-called "flexible") instruments.

2008; Orttung, 2008; Chiavari and Pallemaerts, 2008; Jefferson Institute, 2009; Transparency International, 2009a/b; Goldenberg, 2010; among others).

In the face of these barriers, new business models have to be elaborated in order to successfully exploit opportunities arising from the implementation of the long-term JI and GIS projects in the Russian market. Such business models need to be flexible enough to enable the continuous adaption to the range of market opportunities and risks. In this context, an Energy Service Company (ESCO) is considered as a market intermediary that could help to effectively overcome some of the transaction barriers and uncertainties identified in this paper (e.g. Martinot, 1998; Panuly et al., 2003; Manchester Knowledge Capital, 2007; Sorrell, 2007) and can serve as an effective entity for the implementation of the JI and GIS projects. The ESCO business model is comprehensive; specifically, it provides knowledge, information, skills, services and financing necessary for the long-term projects. *First*, through Energy Performance Contracting (EPC), an ESCO accepts project performance risks by ensuring energy efficiency and savings, and potentially supporting carbon mitigation. *Second*, it can arrange project financing and thus take over customer credit or other financial risk. *Third*, an ESCO with proper qualifications can ensure provision of qualified and reliable services. *Fourth*, many of the ESCO[9] services are compatible with the aims, project procedures and tasks of the market-based JI and GIS mechanisms. Hence, JI and GIS can be effectively integrated under the ESCO conceptual framework.

Multinational ESCOs have had some success in a number of countries, especially the U.S., Canada, Brazil, South Korea, Czech Republic, and Hungary (Evans, 2000; Vine, 2005). In Russia, in contrast, ESCO activities are still in a nascent stage. To date, there is no comprehensive review of the ESCO industry in Russia and not much research that is widely and internationally accessible.

In this paper, therefore, we pursue to fill part of this research gap and argue that the ESCO business model could increasingly gain importance for foreign companies in the Russian energy market. In order to enable a broad analysis of the issues raised, we pose the following five research questions:

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[9] Note that a detailed consideration of the ESCO business model and its extension with potential additional tasks arising from its combination with JI and GIS models is beyond the scope of this paper. For useful discussions of the ESCO business model see Bertoldi et al., 2003; Dayton et al., 1998; Evans, 2000; Panuly et al., 2003; Vine, 2005; among others.

1. Are Russia's central government's efforts to upgrade its energy infrastructure and to reduce environmental pollution sufficient?
2. What kind of market-specific transactional barriers limit FDI aimed at enhancing the modernization of the Russian energy industry?
3. What is the current status and future potential of the JI and GIS mechanisms in Russia?
4. How does an ESCO business model have to be adapted to suit the Russian market conditions?
5. Can JI and GIS be effectively promoted under the framework of an ESCO business model, in order to overcome the market-specific barriers in the Russian energy sector and the uncertainties about the long-term global future climate change policies?

For tackling these five research questions in turn, the paper is structured as follows: Section 2 provides a short overview of the status quo and potential for improvements in energy and carbon efficiency in the Russian energy industry, which is followed by an assessment of the recent Russian governmental policies and stance to the energy efficiency and climate change issues. In the light of huge needs for FDI and technology transfer, in order to achieve significant energy and carbon efficiency improvements, section 3 deals with the assessment of the conditions for FDI formation in the Russian energy sector. Based on a number of scientific and some non-scientific studies, major barriers for FDI in the Russian energy sector are identified and classified. Such a classification of the FDI barriers supports the further analysis of the development, implementation and potential of the JI and GIS mechanisms in Russia in the remainder of the third section. Section 4 provides a short characterization of the ESCO concept (section 4.1), followed by a discussion of barriers and opportunities for an ESCO business model that is tailored to the Russian energy market (section 4.2). It also contains a critical discussion on the possibility to effectively integrate JI and GIS project schemes under the ESCO business model framework for overcoming some of the major transactional barriers and uncertainties arising in the longer term when aiming at the modernization of the Russian energy sector (section 4.3). Section 5 concludes.

2 Energy efficiency and carbon mitigation in Russia

2.1 Status quo of the energy and carbon efficiency and potential for improvement

2.2.1 Overall economy

The Russian economy is one of the most energy- and greenhouse gases (GHG) emissions-intensive in the world, as illustrated in Figure 1. And although the energy intensity[10] of the Russian economy declined by 2.5% per annum in the period 1990-2007, Russia still uses 1.5-3.2 times more energy per unit of GDP than the world average (Moe and Tangen, 2001; PEEREA, 2007) (Figure 1). After the economic collapse in 1990, GHG emissions have dropped by almost 34%. Nevertheless, Russia still remains the third-largest contributor to the world's CO_2 emissions, after the U.S. and China (EIA, 2007; UNFCCC, 2008). The power and heat sector[11], for example, consumed more than half of primary energy and produced about one-third of Russia's total CO_2 emissions in 1999 (IACCC of the Russian Federation, 2002).

Fig. 1 Global comparison of energy intensity per GDP (PPP)

Source: World Bank (2008)

The high energy and carbon intensity of the Russian economy is largely a result of the central planning system in the former Soviet Union, followed by the period of almost no investments in its modernization, in spite of the privatization in the early 1990s. More than twice as much energy and raw materials were used in order to produce the same amount of final products as in a typical market economy at that time. According to Martinot (1998), the enterprise managers in the former Soviet Union lacked incentives to reduce production costs and to

[10] Energy intensity of GDP – energy unit consumed per unit of GDP. Energy intensity is the most commonly used indicator of energy efficiency (UNDP, 2010).

[11] The Russian power industry is the fourth largest power producer in the world, after the U.S., China and Japan, with a total installed generating capacity of about 221 GW (IEA, 2008). It provides more that 59% of the country's total electricity and more that 30% of its total heat supply (Rosstat, 2009).

innovate because of unknown risks of new technologies, which could impede meeting their production targets. Hence, energy-efficient distributed technologies, for example, as alternatives to the widely implemented large centralized district heating systems, were hardly ever considered (Martinot, 1998).

2.1.2 Industry level

Furthermore, the absence of an investment culture regarding the reduction of the high energy and carbon intensity of the Russian industry, distinctive for the Soviet Union era and even for the Russian industry over the last 20 years, can be explained by several factors. First, in the Former Soviet Union, energy supply was a guaranteed public service and the Russian energy companies were required to supply customers even though they had not paid their bills (IEA, 1995). This non-payment problem for energy bills was responsible for a huge share of non-barter transactions that was virulent after the collapse of the Soviet Union. Due to such non-cash transactions, the ability of energy companies to invest into modernization was strongly impeded. Only in 2000, the Russian government prohibited non-cash transactions at all levels (IEA, 2002). Second, the rate of capital replacement in the energy sector is generally low due to the long lifetime of assets needed for the production, supply and use of energy. This discouraged many investors seeking for a timely return on investment in order to reach the production imperatives in place of the former Soviet Union. Third, the low energy price level and the lack of energy price signals have not helped to intensify the implementation of more energy-efficient technologies during and after the Soviet era.

The factors mentioned can be held responsible for the actual situation, where the abrasion of the primary equipment of the energy sector has reached a stunning 57.8% in 2004, and where some 75% of the planned investments for retrofit were effected in 2003-2004 alone (Accounts Chamber of the Russian Federation, 2006).[12] Such a high level of technical inefficiencies in energy production and consumption due to obsolescence causes huge energy wastage. These figures illustrate the desperate need and high potential for the modernization of the Russian energy sector.

2.1.3 Energy-saving potentials and capital scarcity

Through the adoption of the existing, commercially available technologies, Russia would achieve energy savings estimated to be approximately 45% of the 2007 consumption level of

[12] According to the "Energy Strategy of Russia through 2020", retrofitting the energy sector requires $4-4.5 billion (bn), whereas only $2.4 bn were actually invested (Accounts Chamber of the Russian Federation, 2006).

energy resources: 20% in heat supply, 30% in power generation, 40% in industry and transportation, and 50% in dwellings[13] (Bashmakov et al., 2008; World Bank, 2008). The achievement of this energy-saving potential is equivalent to the monetary saving of $120-150 billion (bn) per year (World Bank, 2008; PEEREA, 2007). Besides, if the whole potential for the improvement of energy efficiency would be realized, the forecasted CO_2 emissions in 2030 will be 20% below 1990 levels[14] (World Bank, 2008). Russia's CO_2 reduction potential is illustrated in Figure 2. It shows the dominance of heat and power generation to reduce CO_2.

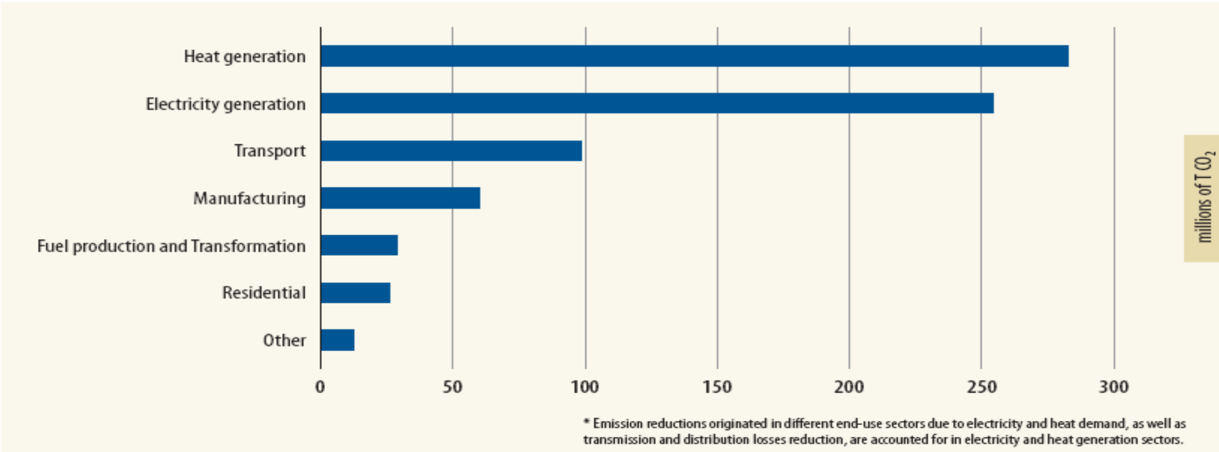

Fig. 2 Russia's CO_2 reduction potential

Source: World Bank (2008), based on CENEf data for the World Bank

However, in order to accomplish the modernization of the Russian energy sector and fully exploit economic energy efficiency and carbon mitigation potentials, Russia requires large upfront capital investments of up to $324-357 bn[15] (UNDP, 2010). However, the question about where the funding for these investments should come from remains unanswered. In addition to the aftermath of the Soviet Union era, the financial and economic crisis during 2008-2009 partly destructed the emerging investment "culture" and negatively impacted the Russian energy industry as energy prices declined worldwide. After some years of relatively

[13] These percentage figures are equivalent to 240 bn cubic meters of natural gas; 340 bn kWh of electricity; 89 million tons of coal; and 43 million tons of crude oil and equivalents in the form of refined petroleum production (Gromov, 2009a).

[14] It amounts to 793 million tons of CO_2 equivalents per year (World Bank, 2008).

[15] This sum of required investments is still 2-6 times less than the average capital investment needed for providing the same amount of energy on the supply side by developing the fuel and energy sector further (UNDP, 2010).

constant growth of the Russian economy, the general investment climate in Russia deteriorated in 2009 and investments sunk by 20.1% in comparison to 2008. As a result, the capital scarcity of the Russian banks made it even more difficult to take out a loan for domestic investments. Due to the many barriers, this discouraged even more to invest in energy-saving and carbon-mitigation technologies.

Nevertheless, the situation of a high energy and carbon intensity in the Russian energy industry should be addressed without further delay, in order to reap the benefits of cost-efficient measures as early as possible and to avoid at least some of the long-lasting consequences of huge energy wastage and environmental pollution. This desperately requires radical action, commitment and understanding of the urgency of those issues by policy makers, supported by an effective regulatory framework, domestic and foreign business leaders with the long-term investment strategies, as well as by society in general – at the international, national and local level.

2.2 Status quo of energy efficiency and climate change policy in Russia

For realizing the existing energy efficiency and carbon mitigation potentials through modernization of the Russian energy industry (and other energy-intensive industries), political and regulatory support and economic incentives are needed. Meanwhile, Russian leaders are starting to acknowledge the inefficient use of energy as a pressing problem for both the economy and the environment. During the summer of 2009, President Medvedev identified energy efficiency as a priority in the technological development of the Russian economy. Recently, several steps were taken in order to formulate the legal base and the policy framework needed for the realization of the energy efficiency and carbon mitigation potential.

In June 2008, President Medvedev signed Decree No. 889, entitled "About some measures to increase energy and the environmental efficiency of the Russian economy", which stipulates a 40% reduction of energy intensity by 2020 in comparison to 2007. This target was also confirmed in the Russian Governmental Programme on Energy Efficiency 2010. In addition, the long-awaited Federal Law "On energy saving and improving the energy efficiency" entered into force in early 2010[16] (Russian Federal Law, 2009).

[16] According to the 2009 Federal Law "On energy saving and improving the energy efficiency", large- and medium-sized Russian companies have to tackle the issue of reducing energy consumption, to produce goods according to their energy efficiency, and to reduce budget expenditures for the purchase of energy resources.

Already in 2003, the "Energy Strategy of Russia through 2020" was adopted by the Russian Ministry of Energy and prolonged in 2010 until 2030, in which energy efficiency was identified as one of the key areas of Russian energy policy. This document, however, is more a guideline than a regulation, describing one conservative and one very progressive forecast for energy generation and consumption until 2030. The aim of the Strategy 2030 is an innovative and efficient energy development by further liberalization of the energy markets. The Russian economic dependence of energy should be reduced by boosting a faster growth of sectors that consume less energy and by exploiting the technical potential for energy savings. The main goals are to create a stable institutional environment in the energy sector, to modernize existing and construct new energy infrastructure, to secure energy and ecological efficiency of the national economy and energy sector, to increase efficiency of reproduction, and to extract and process energy resources in an efficient way (Gromov, 2009a). These goals are to be realized in three phases. In the first phase, ending between 2013 and 2015, the strategy focuses on the recovery from the current economic and financial crisis. In its second phase, ending in 2020-2022, the emphasis is put on the introduction of innovative technologies and more efficiency into the fuel and the energy sector. An expansion of renewable energy, including renewables and nuclear power, as well as a shift to the efficient use of energy across the Russian economy would occur only in its third phase, ending approximately in 2030.

The stance to the climate change issue, for a long time one of the topics high on the global political agenda, cannot be easily identified in Russia. Even though Russia played a crucial role for the entry into force of the Kyoto Protocol in 2005, the climate change issue for a long time had no high priority on the Russian national political agenda. One of the reasons is presumably the fact that climate change has been regarded by the majority of Russians as not being a serious problem, compared to other pressing environmental issues and policy concerns. Moreover, many leading Russian scientists, working on the issue of climate change have been sceptical about the notion that climate change overall really has a negative impact on the country (Dankers et al., 2010; Müller, 2004b; Izrael, 2007; Zaitsev, 2007). Some of them do not consider climate change at all a result of the anthropogenic GHG emissions to the atmosphere. Others are convinced that climate change could, overall, be beneficial for Russia

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Most energy-intensive organizations have to conduct energy studies/audits, introduce energy-savings and energy efficiency programs, and create a single inter-agency information and analytical energy efficiency system in line with a transition towards the long-term energy tariff regulation. In addition, the law promises to introduce energy efficiency standards for new installations and buildings (Russian Federal Law, 2009).

(Arutyunov, 2005; Lioubimtseva, 2010; Perelet at al., 2007). In particular, some studies report that an initial warming of 1 °C and CO_2 fertilization may even boost agriculture and human health in some areas of Russia, providing for a near-term gain of 1-3% of GDP (Perelet et al., 2007). However, in the long term, most of the scientists agree that greater warming would have predominantly adverse effects worldwide (Meleshko, 2007; Tol, 2001; Perelet et al., 2007, Shmakin, 2009). Specifically in Russia, taking into account its large territories and long coastal line, global warming in the long term has the potential to cause major natural disasters, among others, with substantial socio-economic consequences.

Nevertheless, the heat wave in June 2010 to some degree alarmed authorities about the urgency of the climate change issue. At the International Sporting Meeting in Moscow on July 30, 2010, President Medvedev announced: "What is happening with the planet's climate right now needs to be a wake-up call to all of us, meaning all heads of state, all heads of social organizations, in order to take a more energetic approach to countering the global changes to the climate" (Shuster, 2010). The Climate Doctrine of the Russian Federation 2009 came into force on December 17, 2009. This Doctrine recognizes climate change and its consequences based on a variety of scientific studies, and aims at the development and implementation of future climate policy (Climate Doctrine of the Russian Federation, 2009). The new list of ecological directives, issued in May 2010 by President Medvedev, was recently released by the Kremlin's press service. It includes, among others, orders to develop a range of environmental protection laws, target programs, and regulations, as well as solutions to improve funding for environmental protection and ecological education. President Medvedev stated that it is distinct that Russia streamlines its ecological policy in order to deal with many environmental protection issues.

During the Climate Change Conference 2010 in Cancun[17], Russia declared that it has no intention to undertake the emissions reduction targets in line with the current form of the Kyoto Protocol for the second commitment period from 2013 to 2017. This announcement was supported by the idea that climate change should be addressed by the implementation of innovative technologies and not by cutting emissions the way it is determined in the Kyoto Protocol (RIA Novosti, 2010). In conformity with the opinion supportable by Canada and

[17] At the UN Climate Change Conference (UNFCCC) in Cancun, 190+ countries reached an agreement to bring the emissions reduction targets and nationally appropriate mitigation actions that were developed in 2010 based on the Copenhagen Accord in line with the UNFCCC framework. Despite this progress, no legally binding agreement that includes Annex I and non-Annex I countries was reached (Bossley, 2011).

Japan, Russia argued that the Kyoto Protocol in its present form is no longer an effective instrument to combat climate change. This argument is based on the fact that the current group of countries with quantified commitments that signed the Kyoto Protocol, accounts for less than a quarter of the global GHG emissions, meaning that developing countries should pledge for the binding emissions reduction targets in the second commitment period, too (Taminiau, 2011).

Based on the above overview of Russia's regulatory framework and the political stance to energy efficiency and carbon mitigation issues, one can recognize some significant advancement in recent years concerning those issues. Russian authorities nowadays focus more on the energy efficiency problem. The improvement of energy efficiency is often considered not only as a solution for increasing energy savings and supply, but also as an economically very beneficial way to reduce CO_2 emissions in Russia and, hence, as an effective means for environmental improvements.[18] This progress is, though, still more "theoretical" and should be urgently supported by the development and implementation of concrete sustainable actions. According to President Medvedev, to be able to achieve the aims addressing energy efficiency and emissions mitigation, there is an urgent need for new, innovative processes and technological solutions, which have to be launched. Otherwise, the delay of modernization will cause a lot of hazardous consequences for Russia: first, the energy security of Russia itself could be deteriorated due to difficulties of meeting the energy and capacity needs of a growing economy. Second, due to the Russian dependence on oil and gas exports[19], the falling energy prices in the foreign markets and the simultaneously rising domestic energy prices (Figure 3) jeopardize the competitiveness of the Russian industries, especially the energy-intensive ones. Third, investments required in energy efficiency will cumulate enormously the later they are realized. This could lead to constraints in exporting energy resources, to difficulties in fulfilling GHG emissions reduction commitments, as well

[18] McKinsey (2009) identified 60 energy savings measures that could be adopted over different sectors, in order to enable Russia to achieve its goals for economic growth with energy consumption and GHG emissions remaining at current levels. The implementation of those particular measures would require about €150 bn of investments in the period 2010-2030, but would yield cost savings of up to €345 bn over the same period. Compared with the levels projected for 2030 in the reference case, these measures could reduce Russian energy consumption by 23% and GHG emissions by 19%. This assessment, however, does not provide any forecasts, as no prediction about the future development of the individual technologies and no definition of any target energy consumption and production levels are included in the study.

[19] Oil and natural gas exports provide more than 60% of Russia's export revenues (US DOE, 2008).

as to questioning Russia as a reliable energy supplier for foreign markets[20] (Bashmakov, 2009).

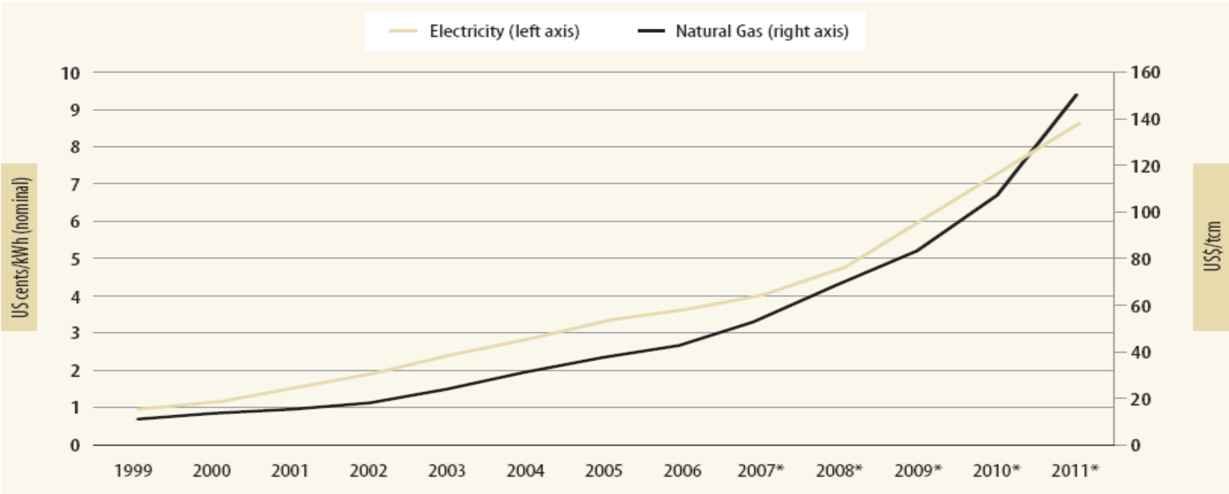

Fig. 3 Rising electricity and gas tariffs in Russia

Source: World Bank (2008), based on FEC, FTS, Minpromenergo, and MEDIT projections for 2007-2010

3 FDI in energy efficiency and carbon mitigation projects in Russia

3.1 Status quo of FDI in the energy sector

In order to avoid the adverse hazardous consequences of energy wastage and huge environmental pollution described in the previous section, the modernization of the Russian energy sector has to occur timely. To be able to fully exhaust the given energy efficiency and carbon mitigation potentials, the Russian government has to acknowledge the essential role of FDI[21] in this process. Besides providing additional capital, advanced management skills, international technology transfer[22] and new job opportunities, FDI can strongly contribute to the sustainable growth and competitiveness of the Russian economy, being on the way to recover from the current economic crisis (Chowdhury and Mavrotas, 2006; Feng et al., 2009).

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[20] Enhancing energy efficiency will improve the competitiveness of the Russian economy given growing tariffs for energy resources. The revenues from extra exports of saved energy (oil and gas) could be increased about US$84-112 bn (Gromov, 2009b).

[21] FDI can be defined as an aggregated flow of capital and technology across international borders or a transfer of resources from one location to another (Spar, 2009).

[22] Technology transfer, according to the Intergovernmental Panel on Climate Change (IPCC) Special Report on Methodological and Technological Issues on Technology transfer (SRTT), is defined as a broader set of processes, covering the flows of know-how, experience and equipment in different sectors of the economy (IPCC, 2000).

Also, the interest of the foreign investors in Russia as one of the 10 largest economies in the world, with a huge potential for the implementation of innovative energy efficiency and carbon mitigation technologies, has been increasing tremendously over the years. This attractiveness of the Russian market is also based on a fast improvement of the economic situation prior to 2008, including, among other things, a declining rate of unemployment, rising per capita income, and an increase in foreign exchange reserves (OECD, 2008). For the period 2009-2011, the United Nations Conference on Trade and Development (UNCTAD) (2009) ranked Russia among the most attractive markets for FDI, after China, the U.S., India and Brazil (UN, 2009). Furthermore, the EU shows interest to invest especially in the Russian energy infrastructure and its modernization, aimed at avoiding any long-term energy supply disruptions, and expects that unfair advantage of Russian energy exporters will be reduced after the completion of its energy market liberalization process (Chiavari and Pallemaerts, 2008).[23]

Generally, a number of precedent conditions have to be fulfilled in order to attract sustainable FDI inflows to the market: political and macroeconomic stability, a transparent and non-discriminatory legal and regulatory environment, as well as bureaucratic and institutional flexibility (Michalet, 2000). Also, a sustainable and predictable investment environment implies the protection of foreign investors' rights. In Russia, in contrast, such conditions for FDI are currently not fulfilled and the formation of FDI is not clear-cut, especially in the energy sector. Specifically, the development of supporting market conditions for FDI is impeded by the following factors: a controversial and continuously changing legal and economic framework; disparities between regional and federal laws and their interpretation; poor corporate governance; ambiguity and lack of clarity in the administrative change and legal bases for investment projects; and an absence of reliable information. Many aspects of business operations remain uncovered by existing laws, or there are no definite mechanisms for the existing law's enforcement (Martinot, 1998). In addition, corruption and bureaucracy

[23] The EU - Russian Dialogue, launched in 2000, provides opportunities at both the political and business level to foster cooperation and solve some of the key problems. These include discussions about barriers to investments in terms of transparency, reciprocity and protection of investors in the energy sector; as well as cooperation on the new technologies and infrastructure projects (Wiedmann and Minx, 2007). Also, many international agreements and programs aim at the development and formation of a sustainable FDI environment in Russia. These include more than 35 Bilateral Investment Agreements, Trade Agreements with the Commonwealth of Independent States (CIS) and the U.S. Overseas Private Investment Corporation (OPIC) (the latter of which provides e.g. loans, loan guarantees and investment insurance against political risks to U.S. companies investing in Russia), and other Investment Insurance Programs (PRS, 2009).

remain serious problems in Russia and discourage many companies from investing, as this does not match with the proper corporate governance rules. According to the country ranking by Transparency International (TI), the Russian Corruption Perception Index (CPI)[24] 2009 was 2.2 and showed hardly any improvement since 1995 (Transparency International, 2009b).

The Russian government has repeatedly emphasized the critical role of foreign investments for Russian economic development. It was many times declared that the foreign investor's rights should be equal to those of Russian investors. This principle is to some degree affirmed in the Investment Code guarantees from 1991. The 1999 "Foreign Investment Law" provided a more consistent legal framework for the protection of the rights of the foreign investors. However, the Russian economy was divided into sectors where foreign companies are allowed to invest almost without bounds; and those – strategic ones – with limits regarding foreign ownership. The 42 strategic sectors include oil, gas, energy, transportation, banking, and others, where the foreign investors need to get a special authorization from the Russian government for acquiring or increasing company shares (Curtis et al., 2009). In order to streamline the acquisition process approval for the foreign investors seeking to invest in Russia's strategic sectors, the Federal Law "On Foreign Investments in Strategic Sectors of the Russian Federation" entered into force in May 2008. It even tightened restrictions on governing the "strategic" assets and does not provide clear criteria for project approvals by the Authorized Body within a Government Ministry (chosen according to the sector in which the project is to be implemented) (Pettibone and Naglis, 2008).

In addition to the general barriers limiting the FDI flow and technology transfers discussed above, a number of further barriers can be distinguished, which strongly affect the enforcement of energy efficiency and carbon mitigation projects, and that are distinctive for the Russian energy sector, include in the following:

1. *Subsidies and still low price for energy resources:* Even though the Russian government gradually increases domestic energy prices, it has been subsidizing the energy market very strongly (IEA, 2008). For example, average domestic Russian gas prices accounted for only 29% of Western European prices in 2006 (taking into account transit charges). These subsidies have channelled capital away from the necessary investments in energy-efficient

[24] The CPI measures the perceived level of public-sector corruption in 180 countries and territories around the world. The CPI is a composite index, drawing on 13 different expert and business surveys. The vast majority of the 180 countries included in the 2009 index score below five on a scale from 0 (perceived to be highly corrupt) to 10 (perceived to have low levels of corruption), see Transparency International (2009a).

equipment in industry and power generation, as there was no possibility to receive adequate returns (Jefferson Institute, 2009). However, the current liberalization of the Russian energy market should lead to an increase in domestic energy prices up to the world's energy market price level during the next years. This liberalization is expected to emphasize benefits of investments into energy efficiency.

2. *Absence of price signals:* Price signals in the energy sector do not work well in Russia. There is a lack of installed meters to measure individual energy consumption and of variable electricity rates for periods of peak and off-peak loads. Unfortunately, the legislations to address this problem have been implemented only very slowly. This causes a lack of incentives to reduce consumption, as a fixed monthly amount of electricity or heat consumed is paid (Jefferson Institute, 2009). Moreover, there is no historical energy consumption data are available, which can be used as a project baseline to measure energy savings and to increase energy efficiency (Martinot, 1998).

3. *Growing role of the state:* The Russian government is taking a greater role as an owner and regulator in the energy sector, which is one of the "strategic" sectors. At the same time, it has shown only little inclination to allow foreign companies even to take only minority stakes (20-25%) in larger projects (Climate for Investment and Trade, 2009). This has often a detrimental effect on international energy companies working in Russia and small innovative companies trying to enter the Russian energy market (Avato and Coony, 2008). This situation, however, clearly contradicts the Russian government's intentions to establish a credible investment and institutional environment for the international capital (Locatelli, 2006).

4. *Strategic state corporations* (e.g. Gazprom, Rosneft, Rosatom, and others): Strategic state corporations have a dominant position in the Russian market and allow foreign investments under the condition that a majority stake is kept by the Russian government (Curtis et al., 2009). Gazprom, for example, could benefit from energy savings on the domestic market, by making available additional amounts of gas for export to foreign markets for a long time. However, there are insufficient incentives to improve energy efficiency, largely because the current contracts for export of natural gas are secured (on the state level) over the next years. Moreover, it is often assumed that the exploitation of the energy savings potential of the Russian energy industry requires higher investments than the exploitation and development of new gas fields (Orttung, 2008; see also footnote 15).

5. *Lack of information about benefits and costs of energy efficiency and carbon mitigation:* Even though the problem of outworn technology is getting more noticeable to many enterprise managers, the problems associated with a lack of information and poor accounting practice about economic and financial costs and benefits of innovative and more efficient technologies are not resolved (Martinot, 1998).

The barriers mentioned cause poor transparency and thus contributing to uncertainties and risks of foreign investors (Feng et al., 2009; Michalet, 2000; Fischer, 2000) and continue to obstruct critically needed infusions of capital in the Russian energy market. This explains the fact that in 2007 only about one third of the cumulated FDI in Russia was allocated in the high potential energy sector in 2007 (US DOE, 2008). The Russian Energy Survey produced by the IEA concludes that mechanisms are needed to provide investors with greater stability by reducing fiscal and legal risks of long-term investment in the energy sector (IEA, 2002). In order to assure the cost-effective opportunities of investing in energy efficiency and carbon mitigation projects, Russia should safeguard a sustainable and predictable investment climate by providing possibilities to generate additional income not only from energy savings, but also from economic and environmental challenges. These conditions are essential, especially for the energy efficiency and carbon mitigation projects that characterized by the necessity of large upfront investments and long payback times.

In the following, we consider the status quo and the future potentials of one of the market-based mechanisms of the Kyoto Protocol (JI) and of the self-binding mechanism (GIS) in the Russian market. Those are not only seen as a way to acquire and transfer ERUs or AAUs, but rather as two possibilities to allocate FDI, transfer technology and know-how by accomplishing the carbon mitigation and energy efficiency projects in Russia.

3.2 Status quo of the JI mechanism

In the previous sections it was emphasized that Russia offers a large scope for reducing CO_2 emissions and increasing energy efficiency at relatively low cost due to its currently high energy and carbon intensity and inefficient technologies. The lack of investments into improvements of the carbon and energy efficiency in Russia was expected to be resolved, at least partly, by means of the timely implementation of the Joint Implementation (JI) mechanism (Evans, 2000; Karas, 2004; Laroui et al., 2004; Korppoo, 2005; Korppoo and Gassan-zade, 2008). In Article 6 of the Kyoto Protocol "Joint Implementation" is defined as a mechanism that allows a country with an emission reduction or limitation commitment

(Annex B country) to earn Emission Reduction Units (ERUs). The investment in an emission reduction or emission removal project in another Annex B country enables the investing country to meet its Kyoto Protocol targets. The achieved emissions savings are measured in tons of CO_2 equivalent after the actual emission reductions have been verified. Generally, JI aims at providing a "win-win situation" for participating countries: the possibility to fulfil part of its Kyoto commitments and to benefit from foreign investment and technology transfer.[25] Also, a range of further opportunities under JI projects and an impact of the Kyoto Protocol on the economic growth of Russia were examined by many scientists (e.g. Golub and Strukova, 2004; Kornilova, 2007; Korppoo, 2005; Laroui, 2004 et al.; Lecocq and Shalizi, 2004; Mastepanov et al., 2001; Mielke et al., 2004; Müller, 2004a). The majority of the scientists stated that the Kyoto Protocol would allow Russia, due to its high carbon reduction potential, to attract a wide range of FDI and technology transfer assuring not only carbon mitigation, but also energy efficiency improvements. For those reasons, JI seemed to be a promising, cost-effective mechanism for the Russian market.

However, Russian government has been developing policies and infrastructure for JI projects with foreign investors' participation too slowly. In May 2007, the long-awaited procedure for approving JI projects, the so-called Decree, was elaborated by the Russian Ministry of Economic Development and Trade (MEDT) and issued by the Russian Government. The finalization of the institutional infrastructure was completed only in January 2008. Half of the planned pilot projects were retained because of a lack of financing (Point Carbon, 2008). Hence JI pilot-phase experience so far was rather discouraging. Until 2009, the Russian Federation has not approved a single JI project, with the consequence that no return on investments has been provided to a single investor (public or private) (Korppoo and Gassan-zade, 2008). This delay strengthened the feeling that Russian JI projects will not deliver ERUs, timely or at least not at the expected scale (Point Carbon, 2008). Such slow development of the JI framework can be explained by several reasons: *first*, the abrupt decrease in the CO_2 emissions level of about 30% in relation to 1990 was suggestive that the carbon mitigating issue has not been considered as a priority for a long time. *Second*, Russia has been receiving more significant revenues from fossil fuel exports (Korppoo and Gassan-zade, 2008). *Third*, the poorly developed financial infrastructure in Russia strongly impeded the timely implementation of JI projects.

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[25] Breton et al. (2005); Fankhauser and Lavric (2003); Korppoo (2005).

Only in late July 2010 the Ministry of Economic and Development Affairs of the Russian Federation under the so-called "Track 2"[26] (2008-2012) procedure finally approved the first 15 JI projects out of 44 submissions from 35 companies.[27] Some of the approved JI projects also aim at improving energy efficiency. Up to 2012, those JI projects have a potential to realize 30 million tons of CO_2 equivalents; this tender was restricted by the state-owned bank "Sberbank" in the first bidding round. If Russia would accredit and realize all designated JI projects till 2012, the share of the Russian JI market could constitute almost 60% of the world's possible total estimated cuts (Szabo, 2010). The coordination of the first carbon credit sales from the first tender will be undertaken by Sberbank. As a latecomer to emissions trading, compared to European and other Western countries, Russia was planning to enter the carbon market by October 2010. However, only in January 2011, Gazprom Neft, the Russian oil-producing and refining company, sold the first ERUs (290,000 tons of CO_2 equivalents) to Mitsubishi and Nippon Oil, i.e. two Japanese companies (Solovyov, 2011).

On the one hand, this kind of progress in the long-lasting process of infrastructure establishment for JI projects and their first approval, as well as a slow development of the Russian carbon market, denote a significant step in issuing a huge amount of the ERUs until 2012. This can improve investors' confidence in the Russian JI market to some extent (Sharma, 2010). On the other hand, during the Cancun Climate Change Conference in December 2010, Russia announced that it is not going to participate in the second commitment period. The extraction of the Kyoto Protocol in its current form into the next period does not seem meaningful to Russia. The argument put forward is the fact that developing countries do not pledge their emission reduction targets in the Kyoto Protocol, even though they are responsible for a major share of the GHG emissions to the atmosphere today (Taminiau, 2011). This causes a twofold situation about the future development of the market-based mechanisms in Russia: on the one hand, Russia acknowledges the high potential and importance of the continuation of market-based mechanisms like JI or IET in the long

[26] The Marrakesh Accords provide two tracks for JI projects. Under Track 1, the relevant host country's JI authority approves JI projects at the national level according to national guidelines, in order to adapt those projects to the different national circumstances (World Bank, 2010). Under Track 2, the JI projects are overseen by an international regulatory body, the Joint Implementation Supervisory Committee (JISC), in order to authorize those projects to earn saleable ERUs (Abbass, 2010; World Bank, 2010).

[27] According to United Nations Environment Program (UNEP) 2011 data, in total there are 110 JI projects planned to be allocated in Russia in line with Track 2, which have the potential to realize some of the existing 300 million CO_2 equivalents, or almost 60% (UNEP, 2011).

term. In this context, the argument that "JI itself is a long-term mechanism that continues from one period to the next, and is not tied to specific commitment periods" can be relied on (UNFCCC, 2011). On the other hand, JI implies that the ERUs can only be generated during the current commitment period 2008-2012. Such a contradiction leaves the future of JI as an investment mechanism in the Russian market unclear, attributing JI with a rather "short-term" character. This may have the consequence that only projects assigned to the period until 2012 will remain of interest to foreign investors, preventing them from long-term investments in the Russian market.

3.3 Status quo and GIS potential

Like the other "economies in transition"[28] after the collapse of the Soviet Union followed by the rash economic downturn, Russia has a huge surplus of GHG emission allowances (Assigned Amount Units, AAUs), measured in relation to the 1990 reference level of the Kyoto Protocol. These surplus AAUs are also known as "hot air", being named so by a group of international environmental non-governmental organizations (NGO) back in 1998. The Kyoto Protocol allows countries with surplus AAUs to bank them, i.e. to keep them from use in the first commitment period, and to use them after 2012 for achieving compliance. In accordance with Article 17, countries are also allowed to sell them through IET to countries that require extra AAUs in order to achieve their emission targets (Kyoto Protocol, 1998). However, almost all potential buying countries (EU-15 and Japan) saw this allowance to sell "hot air" with criticism. The main point of critique is the fact that "hot air" has not been reached through concrete emissions reduction activities, but is primarily the result of the economic collapse of energy-intensive industries (Gorina, 2006).

To address this situation and to ensure the climate effectiveness of the IET with surplus AAUs, the *Green Investment Scheme (GIS)* has been introduced. However, there is still no internationally-agreed definition of GIS and no international requirements' agreement on how GIS should be approached by countries (Sharmina et al., 2009). GIS is neither a part of the Kyoto Protocol nor the Marrakech Accords (Tangen et al., 2002; Blyth and Baron, 2003). From the legal perspective, "GIS is a self-improved binding commitment by the potential seller countries, to fulfill the conditions of the potential buyers" (Sharmina et al., 2009, p.500). According to the GIS scheme, the revenues from sales of surplus of AAUs have to be

[28] "Economies in transition" are countries that derived from the dissolution of the Soviet Union in the 1990s, and former Eastern-Bloc states, that are now part of the European Union (Elzen et al., 2010).

reinvested in environment-improving activities, so-called “green investments”, in the selling country. Besides, GIS can be adapted to the projects aiming at improvements of energy efficiency as well (Ürge-Vorsatz et al., 2007).

There are two main approaches to design GIS: the program and the project approach. The program approach allows a buyer country to purchase the required AAUs in the IET. The seller country should invest the achieved revenues through this deal on some domestic environmental or energy efficiency activities, mainly through bundling of a number of small projects. This type of GIS approach is providing a source of funding, e.g. for some governmental programs in the selling country, rather than a direct link between buyer’s activity and the actual emission mitigation projects in the seller country. The project approach focuses on larger-scale projects characterized by more complexity and a longer planning and implementation period. It provides some similarities to JI and could be an interesting option for the Russian private companies to conduct AAUs trading more independently from the government, as the buyer of AAUs can be directly involved in the development and approach of the mitigation project (Kokorin, 2003).

GIS can also take two main forms: “hard greening” or “soft greening” (Tangen et al., 2002; Blyth and Baron, 2003). *Hard greening* is coming closer to JI; it refers to activities in which the greening process can deliver measurable and quantifiable ERUs. Under this form, the greening ratio of GHG emissions reductions and emissions reduction credits transferred must be 1:1, implying relatively strict verification and additionality requirements. Investors mostly prefer “hard greening”, as they seek to achieve measurable results in order to avoid a misuse of their allocated funds. *Soft greening* refers to the activities with non-quantifiable and non-measurable emissions reductions. A greening ration of AAU can be larger than GHG reductions itself (Kokorin, 2003; Tuerk and Ürge-Vorsatz, 2009). This form is mostly applicable in areas with a lack of public financing, e.g. for capacity building, education for awareness rising, or social programmes, where the quantifiable reduction results can be achieved in the future (Tangen et al., 2002).

The experience of GIS implementation in some AAUs selling Central and Eastern Europe (CEE) countries, including Hungary, Slovakia, the Czech Republic, Latvia, Estonia, Ukraine and Poland, is not clear-cut. On the one hand, there is a significant progress in implementing GIS and some credible GIS frameworks were formed during the last years. On the other hand, those countries were confronted with difficulties exposed during the GIS projects’ accomplishment. According to Tuerk and Frieden (2010), in some cases the identification of greening components of the project was a quite irritating process. The possibility to comprehend that the investment funds were really spent on environment-improving activities was emphasized to be essential for the success of a GIS project. A lack of experience with a long enforcement of emission reduction measures remained also one of the most crucial issues of GIS (Tuerk and Frieden, 2010). Especially during the current economic crisis in CEE countries, there was a lack of funds to co-finance GIS. In most cases, the revenues from the AAU sales were sufficient to cover only some part of the investment costs of the greening activities. This caused a necessity of searching for additional capital sources. Furthermore, limited implementation capacity of selling countries of CEE affected and restricted the supply of credible GIS-backed AAUs in the short term (Tuerk et al., 2010).

In spite of the huge amount of “hot air” of about 30% below 1990 levels, Russia has been slow in developing GIS. The intention to implement GIS was announced only in 2010. The leading role in the preparation of the GIS deals was also assigned to Sberbank; it is currently in discussions with possible AAU buyers, including Italy and Spain. Russia is likely to limit sales to 100 or 200 million AAUs (Tuerk and Frieden, 2010). However, to be able to participate in the IET market scheme, Russia has to meet several requirements: provision of a national inventory, reporting, and establishing of a national registry compatible with the international standards (Kotov and Nikitina, 2003). Tuerk et al. (2010) explains in their study the slow development of GIS in Russia by the fact that the Russian government is more interested in extending the GIS into the post-2012 regime. “Hot air” should be kept as “strategic reserves” in order to use it as a possible compliance to avoid any dampening the future economic growth (Tuerk et al., 2010). Due to the financial and economic crisis of 2008-2009, Russia’s emissions recently declined by an additional 7-8%, so that CO_2 emissions are now roughly -37% below 1990 levels (Elzen et al., 2010). However, the possible revenues from AAU sales are still of no high priority, compared to other, far more profitable business areas, such as oil and gas exports (Tuerk et al., 2010).

Generally, the GIS approaches’ flexibility and ability to undertake different forms can potentially provide some significant advantages over JI projects and, hence, be more effective in the longer term. Sharmina et al. (2009) states in their study that JI projects need large upfront investments and undergo a long crediting period until a significant amount of credits can be generated and, hence, transferred as ERUs (Sharmina et al., 2009). GIS, in contrast, delivers funds timely as it is based on revenues from the surplus AAUs, which can be sold in the present point in time for emission reductions occurring in the future (Tuerk and Ürge-

Vorsatz, 2009). JI projects are characterized by complexity of the additionality test and are bound by criteria of additional emissions reduction in the first commitment period 2008-2012. Especially in the transitional countries with rapidly changing economic conditions, it is extremely difficult to define baseline emissions or business-as-usual emissions at the actual facility. Besides, the approval process of JI projects takes too long. Additionally, monitoring and verification procedures, as well as high transaction costs make JI mostly inapplicable to small-scale projects. As a result, such complexity of JI causes delays in return rates and increases investment risks (Kokorin, 2003).

GIS could overcome some of these barriers by applying simpler approaches to monitoring and verification and, hence, by lowering transaction costs (Sharmina et al., 2009). As mentioned above, GIS is still a host policy option and was developed initially as an agreement to be applied on the intergovernmental level; however, business started to arouse its interest in GIS due to such investment flexibility. GIS raises investors' contentment and, therefore, provides additional financial sources for GHG mitigation and increases in energy efficiency by timely positive environmental and energy savings outcomes. GIS could allow a direct cooperation with the foreign investors seeking to overcome the bureaucratic procedures typical for most of the JI projects. Those features of GIS support timely investments in areas where investments are needed now (IEA, 2006).

However, the fact that most cost-efficient and high potential areas for carbon mitigation and improving energy efficiency in Russia remain underinvested emphasizes that both mechanisms, JI and GIS, are facing almost the same range of barriers and uncertainties: (1) Russia's market-specific barriers described in the previous section and (2) uncertainties about the future development of the world's climate change policies. The outcome of the Climate Change Conference 2010 in Cancun increased also, among others, uncertainty about the continuation of the international AAUs trading after 2012. Specifically, is not clear how the AAU's price will develop, whether AAUs will have some value at all after 2012, or whether AAU's banking will be restricted. Such uncertainty is easily carried over to GIS as it is focused on the emissions trading under Article 17 of the Kyoto Protocol. Consequently, many foreign investors show, on the one hand, a great interest in this concept. On the other hand, it is still quite difficult for them to hedge such a big range of given risks and to handle the uncertainties adequately.

JI and GIS mechanisms offer international companies many possibilities for FDI and technology transfer in Russia, aiming at achieving sustainable energy efficiency and carbon mitigation. However, many risks, market-specific transaction barriers and uncertainties discussed above limit such investments and transfers. For this reason, there is a necessity to adjust and reform these mechanisms, or even to explore new instruments and models enabling e.g. private companies to deal with the problems of energy wastage and environmental pollution in a timely manner.

4 ESCO – a possible driver for JI and GIS projects in the Russian energy market

4.1 The ESCO concept

In the face of numerous market-specific transactional barriers and uncertainties about the future climate policies, market intermediation is getting very important. *Energy Service Companies (ESCOs)* can play a crucial role as a source of financing and as an instrument to overcome transactional barriers (Bertoldi et al., 2003; Bertoldi et al., 2006; Dayton et al. 1998; Painuly et al., 2003; Vine et al., 1999; among others). In the Directive 2006/32/EC[29] of the European Parliament and of the Council of April 5, 2006 "On energy end-use efficiency and energy services and repealing", an ESCO is defined as "a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria" (CEC, 2006, p.68). Besides, an ESCO can be a private or a public company, aiming not only at increasing energy efficiency and energy savings, but also at mitigating GHG emissions. Typical clients for ESCO services are energy companies, and their customers as well as energy-intensive industries. Bertoldi et al. (2003) identified the following typical elements for an ESCO project (Bertoldi et al., 2003, p.3):

- Investment grade energy audits;
- Identification of possible energy-saving and efficiency-improving actions;
- Comprehensive engineering and project design and specifications;
- Guarantee of the results by proper contract clauses;
- Code compliance verification and guarantee;

[29] Since June 23, 2011, there is the Draft Directive of the European Parliament and of the Council (SEC(2011) 779) final on energy efficiency and amending and subsequently repealing Directives 2004/8/EC and 2006/32/EC.

- Procurement and installation of equipment;
- Project management and commissioning;
- Facility and equipment operation and maintenance (O&M) for the contract period;
- Purchase of fuel and electricity;
- Monitoring and verification (M&V) of the savings results.

An ESCO can take the project performance risk (associated with the project technical risk), arrange financing for the project, and, depending on the agreement with the client, also the customer credit risk (financial risk) (Vine et al., 1999; Painuly et al., 2003). This can be reached through an *Energy Performance Contract (EPC)*[30] between an ESCO and a customer. An EPC includes energy information and control systems, energy audits, installation, operation and maintenance of equipment, competitive finance, and fuel and electricity purchasing. The expected revenues from the project, which are generated from the future energy savings due to the installation of new technology or equipment, are also regulated in the EPC. Based on such commitments, an EPC is often used as a basis document to acquire funds for the project financing (Harmelink and Soffe, 2001). Two well-established models of ESCO's operation can be identified (Sorrell, 2007):

- *Shared savings contract:* An ESCO finances the project either from own funds or by borrowing from some third party, and assumes both the performance and credit risk.
- *Guaranteed savings contract:* Finance of the projects is usually arranged by an ESCO, but the contract for loan is concluded between the customer and the bank, or a third party. The ESCO takes only the performance risk by guaranteeing the savings.

Meanwhile, the ESCO industry is becoming an expanding business in various parts of the world, contributing to the improvement of energy efficiency, control of energy costs and reduction of GHG or other emissions (Bertoldi et al., 2009). The first ESCO concept was introduced in Europe more than 100 years ago. The idea for companies of this type was transferred to the U.S. in the 1970-1980s "in order to respond to the growing demand for energy-saving interventions in the public and private sector" (Baldi, 2007, p.21). The more European policy is geared towards restructuring and liberalization of the electricity and gas

[30] EPC is "a contractual arrangement between the beneficiary and the provider (normally an ESCO) of an energy efficiency improvement measure, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement" (CEC, 2006, p.68).

markets, as well as to climate change issues, the more it shapes an optimal business environment for the development of the ESCO industry to "come back" (Vine et al., 1999; Painuly et al., 2003). Such a dynamic development of the ESCO industry is primarily based on numerous advantages of the ESCO business model (Manchester Knowledge Capital, 2007):

1. *Technical capacity and capability:* Due to the core business of an ESCO – the efficient provision of energy services to customers it – ensures availability of technical and commercial expertise, manpower, and experience;
2. *Performance risk management:* As the main share of revenue of the ESCO business model comes from the achieved reduction either of energy costs, energy usage or carbon emissions, an ESCO is typically strongly interested in the proper identification, monitoring, verification, and documentation of the results during the project;
3. *Flexibility and financial benefit:* Major energy efficiency and carbon mitigation projects are capital intensive. An ESCO is able to access sources of funds more easily than the customer and, hence, bridges the gap between those two parties. Besides, an ESCO can provide the facility for capital investment to be made off the customer's balance sheet. Hence, the customer cannot only reduce energy costs and transfer risk, but also release capital for its own core investment activities. The fact that ESCOs typically take over the technical and financial risks from a customer or a funding body induces it to develop projects very carefully.

Unfortunately, many developing countries and countries in transition are still mostly unfamiliar with the ESCO concept and its application possibilities between different parties (Painuly et al., 2003).

4.2 Development of the ESCO business model in Russia

The development of an ESCO industry in Russia features two important aspects. According to the opinion of some Russian experts, there is a young dynamic ESCO market in Russia (Efremov et al., 2004; Gakal, 2009). Many Western scientists and experts, though, believe that there is no ESCO market yet or, if there is one, it is absolutely in its nascent stage (Martinot, 1998; Evans, 2000; Kiss et al., 2007), especially, when the ESCO's definition and concept introduced above, further to be referred as a "Western-ESCO", is taken into account.

There is insufficient information and a lack of reliable significant statistics on the development of the ESCO business in Russia and very little scientific work about the progress on this topic so far. Gakal (2009) states that few operating ESCOs could be identified in the Russian market. However, the author names those "*Pseudo-ESCOs*" and provides an argument that their business model is not conforming to the ESCO business model accepted in the Western countries. The author argues that Pseudo-ESCOs are not able to provide comprehensive energy solutions (Gakal, 2009; Bertoldi et al., 2009). The main difference of the Russian Pseudo-ESCO is, according to Gakal (2009), the fact that under the Russian Pseudo-ESCO model, EPC implementation is not used, while in the Western-ESCO model EPC is an essential part of the concept that is even legally regulated. Russian Pseudo-ESCOs adopt the role of an intermediary, assisting the energy bill payments based on the automatic control- and energy bill collection system developed for this purpose. This kind of service is not included into the Western-ESCO model. In Russia, such services are often based on the need of the energy-producing companies to solve the persistent non-payment problem of energy bills discussed in section 3. Therefore, Pseudo-ESCOs are paid a certain pre-agreed percentage share of the transacted payments by the energy supply companies.

Generally, Russian commercial banks are not willing to provide the loans for investments in energy efficiency and carbon mitigation projects as those are classified as highly risky. For this reason, the Russian Pseudo-ESCOs have to carry the financial side of such projects by themselves, mostly using leasing models, in order to be able to provide the equipment to the client (Gakal, 2009). According to the Russian legislation, leasing schemes seem to be very promising for the Russian Pseudo-ESCOs. They offer considerable benefits for the clients and provide important means of control over the measures implemented upon the financing attracted by ESCO companies from their own sources or, rather rarely, from the financial institutions. Further sources of revenues of the Russian Pseudo-ESCOs are based on the energy audit and technical services for the implemented equipment during the project, and not on the energy savings as in Western-ESCOs.

Due to the broad scope of advantages of the ESCO concept, Russian authorities show increasing interest in the Western-ESCO concept. Its promotion seems to be a very promising pathway, also in the light of the ongoing market liberalization[31] and related orientation at the real cost of energy. However, in order to promote the development of an ESCO industry in

[31] The progressive liberalization of the Russian electricity market began in 2007 and is going to be completed by 2011 (IEA, 2008).

Russia based on the Western definition, it is essential to consider in adjacent to some "common" barriers, with which the ESCO industry is normally confronted[32], and some "specific" ones for the Russian market (Bertoldi et al., 2009):

1. The Western-ESCO model in its original form is still unknown in Russia; there are no established ESCOs capable of ensuring reliable and effective design management;
2. There is no regulation basis for the well-functioning of ESCOs: neither the energy service nor the ESCO model is defined under the Russian Federal Law "On energy saving and improving the energy efficiency" (Russian Federal Law, 2009);
3. After the introduction of energy-efficient equipment in practice by Pseudo-ESCOs, there is a lack of awareness and demonstrative practice in the calculation of the obtained energy savings on a systematic basis, and in accumulation and distribution of the data among participants (Bertoldi et al., 2009; Gakal, 2009). Also, a lack of historical data on energy as a project baseline (or business-as-usual) strongly affects an ESCO's well-functioning, as it is highly dependent on the effective technical evaluation of current and potential operating efficiencies, technical expertise and realism (Manchester Knowledge Capital, 2007);
4. As there is no practice in monitoring of the financial savings, no guarantees for the investments and expected revenues could be provided. The practice of identifying of the investment recovery period also remains unclear for the participants;
5. For the well-functioning of ESCOs, a stable financial mechanism should be assured, in order to provide the working capital needed for marketing, project preparation, and development. For this purpose, several possible financing sources (e.g. private banks and lending institutions, venture capital firms, equity funds, strategic partnerships, leasing companies, and equipment manufacturers) should be investigated in a timely manner (Bertoldi and Rezessy, 2005).

4.3 ESCO as an integrated (umbrella) concept of JI and GIS in Russia

As it was discussed above, there is a huge potential for the reduction of energy and carbon intensity of the Russian energy industry. Consequently, in order to exhaust the given opportunities, Russia requires new business models to attract and secure extensive investment

[32] These barriers are partly conforming to the barriers for FDI in the Russian market identified in the previous section.

funds, and to reduce transactional barriers and risks. The ESCO concept in its origin provides numerous advantages and allows an overcoming of the majority of transaction barriers and, hence, diminishes risks. JI and GIS projects can be integrated and promoted as a portfolio under the ESCO framework. Such a new and integrated concept would open a new operational field and provide a "win-win-win" situation (for the foreign companies, the modernization of the Russian energy market, and the environment). Compatibility between these instruments is discussed in the following:

- The ESCO as an intermediary could support a selection process and asses the profitability of the potential energy efficiency and carbon mitigation project in the Russian market. In this process, the ESCO's ability to bundle small-scale projects for achieving economies of scale would allow an application of the JI mechanism not solely to large-scale projects. As it was discussed before, the revenues of an ESCO depend on the proper planning and accomplishment of the projects, constituting a kind of success guarantees needed for profitable JI and GIS projects;
- The EPC implemented in the ESCO concept could be fitted to one another with the Emission Reduction Purchase Agreement used in the JI to deliver emission reductions. Under the GIS, EPC would deliver guarantees, thus assuring the environmental effectiveness of the projects for achieving a credible "greening" effect;
- Many elements of an ESCO are already partly conforming to those applied in JI and GIS projects: those elements and services represent core competences of an ESCO anyhow. For example, the definition of a baseline or a business-as-usual scenario, as well as monitoring, reporting, audit and verification procedures used in JI and GIS could be provided by an ESCO. Such kind of outsourcing reduces the risks arising from difficulties of those services during the implementation process of JI and GIS projects;
- The fact that ESCOs, by providing different types of technologies, nowadays are concentrating not only on energy efficiency but also on carbon mitigation projects, would allow companies the usage of emission reductions or emission allowance (ERU) gained from such projects.

The aspects presented show that there is a considerable potential and need for intermediaries such as ESCOs, which can assist the accomplishment of JI and GIS projects in the Russian market. However, some issues remain unclear that would make such integrated ESCO models work in the Russian market. It requires a robust framework based on a stable legal and regulatory environment. The implementation of the Western-ESCO concept in Russia, without considerable adaptation of its business model to the energy market-specific conditions, would not be sufficient for achieving a sustainable range of synergies. In addition, the different requirements and approaches adopted by each host country of JI and GIS make it more complex for an ESCO seeking to operate worldwide. It is questionable, however, whether ESCOs are willing to implement additional tasks and risks associated with JI and GIS, as ESCOs do not have commitments on the governmental level. The compatibility of the concepts suggested above is theoretical, though, as there is no empirical evidence of such an integrated model in practice yet. Nevertheless, a well-functioning synthesis of these instruments could be achieved, in order to generate considerable synergy effects that could play a vital role in the period post-2012 and open a new range of business opportunities. The important feature of an ESCO, viz. to overcome transaction barriers and to mitigate risks, assure energy savings, and aggregate emission reductions from multiple projects, which would improve the belief in the profitability of JI and GIS projects in the Russian market, thus assuring technology transfer and FDI flows on the long term.

5 Summary and conclusion

This paper has focused on the perspectives and barriers for FDI in energy efficiency and carbon mitigation projects in the Russian energy industry by means of a review of the relevant scientific and non-scientific literature. The industry is characterized by worn-out and inefficient equipment causing extensive energy wastage and carbon emissions to the atmosphere.

The assessment of the current and the future energy efficiency and carbon policies as well as market trends in Russia showed that there is some shift in understanding of the importance of energy and carbon efficiency improvements. This shift was affected, to some extent, by the recent economic and financial crisis characterized by the drop of the world's energy prices. The huge energy wastage is getting more noticeable in the Russian economy, which is dominated by energy exports. Also, the current liberalization of the Russian energy market is aiming at increasing domestic energy prices up to the world market level in the next years. Under such conditions, the Russian energy sector is forced to diminish the costs of energy production and consumption through enhancing energy efficiency and, hence, mitigating GHG emissions.

Up to now Russia's efforts to upgrade its energy infrastructure and to reduce environmental pollution seems to be insufficient, and the question remains unanswered from where the investments needed for this modernization should come. For these reasons, Russia should acknowledge the important role of FDI and secure consistent and non-discriminatory treatment of foreign companies, in order to build up a stable investment climate that can form a basic framework for turning the situation of high energy and carbon inefficiencies into a huge business opportunity.

Timely investments and the technology transfer needed for the reduction of energy and carbon intensity in the Russian energy industry, however, are strongly impeded by numerous barriers and uncertainties. In this paper, we have classified these barriers in two main groups: (1) transaction barriers specific for the Russian energy market and (2) uncertainty about the future post-2012 climate change policies (and the Russian stance to this). Specifically concerning Russia, transaction barriers are mostly related to a lack of investments; controversial regulatory framework; slow progressing of the market conditions' formation for FDI; the growing role of the government in the "strategic" sectors; a lack of understanding and incentives to invest into modernization; bureaucracy and corruption; and – in spite of the ongoing liberalization of the energy market since 2005 – still relative low energy price levels. The second group of barriers builds upon the uncertainty about the next legally binding agreement on the international climate change regime for the period post-2012, which was reached neither at the UN Climate Change Conference in Copenhagen 2009 nor in Cancun 2010. Furthermore, during the Climate Change Conference in Cancun 2010, Russia showed strong opposition to join the second commitment period 2013-2017 of the Kyoto Protocol in its current form (Goldenberg, 2010).

Timely implementation of the JI and GIS mechanisms is expected to bring manifold economic and environmental benefits for Russia and foreign investors. An industrial implementation of the energy efficiency and carbon mitigating technologies by means of JI and GIS can generally be seen as a driver for economic growth, creating competitive advantages and new jobs, as well as attracting numerous FDIs by considerable revenues into the energy sector. However, the development of the JI and GIS mechanisms in Russia to date has remained at an early stage. More specifically, the progress of development of the regulatory framework for JI projects by the Russian government can be characterized as too slow, while almost no progress occurred concerning the establishment of the legal framework for GIS. In addition to the transaction barriers for FDI in the Russian energy sector identified in this paper, the uncertainty about the exact form of the next climate agreement and the Russian stance to this strongly affect the future potential of the JI and GIS projects, rendering them as investments with a rather short-term character only.

Under the given circumstances, we conclude that a new integrated business model is strongly needed in order to exploit the existing opportunities, and to overcome numerous barriers, for accomplishing energy efficiency and carbon mitigation projects in Russia. In the analysis, we considered the ESCO concept to be well suited to integrate, and if necessary adapt, best-practice projects out of the JI and GIS mechanisms and to make them work in the long term. The considerable potential of such an integrated model is based on the complementarity of the ESCO, JI and GIS concepts. The integrated ESCO concept could effectively generate synergies, by combining e.g. the following features: (1) the ability of an ESCO to overcome transaction barriers and mitigate risks, to ensure energy savings and to aggregate emission reductions from multiple projects; (2) the feature of JI to incentivize cross-border investments into carbon mitigation projects in order to generate emissions savings and to achieve reduction targets; (3) the feature of GIS to combat the persisting problem of “hot air” and to achieve a timely “greening” effect; and (4) the ability to apply those mechanisms to small- and large-scale projects in the field of energy efficiency and carbon mitigation.

However, as every new business concept, an integrated ESCO model needs most efforts and time in its introduction and modification phase, by opening a new operational field and by providing a “win-win” situation for every participating party. The integrated ESCO concept should be flexible enough to apply and adapt EPC and further related services under Russian market conditions. This requires, however, a deep understanding of the framework of the Pseudo-ESCOs operating in the Russian market, and implies the Russian ESCO market research. In order to improve the belief in the profitability of the well-functioning of the integrated ESCO concept, assuring technology transfer and FDI flow in the long term, the Russian government should provide a robust framework that is based on a stable legal and regulatory environment, an absolutely essential element for the sustainable development towards an efficient and low-carbon Russian economy.

Abbreviations

AAU	Assigned Amount Unit
CEE	Central and Eastern Europe
CIS	Commonwealth of Independent States
CO_2	Carbon dioxide
CPI	Corruption Perception Index
EPC	Energy Performance Contracting
ERU	Emission Reduction Unit
ESCO	Energy Service Company
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross domestic product
GHG	Greenhouse gases
GIS	Green Investment Scheme
GW	gigawatt
IET	International Emissions Trading
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
kWh	kilowatt hour
MEDT	Ministry of Economic Development and Trade
M&V	Monitoring and verification
NGO	Non-governmental organization
O&M	Operation and maintenance
SRTT	Special Report on Methodological and Technological Issues on Technology transfer
TI	Transparency International
UN	The United Nations
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
U.S.	The United States of America

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