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# COMPARISON OF ENERGY EFFICIENCY MEASURES IN RUSSIA TO THOSE IMPLEMENTED BY DEVELOPED COUNTRIES (INCLUDING IEA MEASURES)

## **Abstract**

The paper considers Russian energy efficiency measures in comparison to the recommendations of the International Energy Agency and to the measures implemented by developed countries. Russia started to actively develop legal bases for energy saving during the Presidency of D. Medvedev. Thus, in 2009 the Federal law on energy efficiency was adopted and a year later Federal programme on energy saving which establishes 89 indicators in different sectors to be achieved by 2020. Government policy on energy efficiency covers mainly state-funded organisations and residential buildings as well as lighting and appliances. Industry and the transport sector, which have considerable energy saving potential, are mostly not covered by the governmental programme. The first assessment of intermediate results by the Center of Energy Efficiency in Russia shows that out of 89 established indicators 47 are not achieved. This is explained by the failure of mandatory energy audits, lack of an energy services market, lack of long-term financial capital, the non-obligatory character of many norms and standards on energy efficiency, and the resulting lack of monitoring.

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## EXECUTIVE SUMMARY

Enactment of the Federal Law on Energy Efficiency in 2009 gave a considerable impetus to the development of the legislative framework on energy efficiency in Russia. This has greatly improved the position of Russia in the ranking of countries implementing energy efficiency measures recommended by the IEA. However, the Russian energy saving measures focused mainly on state-funded organisations and residential buildings as well as lighting, while transport and industry were mostly not covered by the law.

Government measures to increase energy efficiency in buildings were partly successful. They led to the reduction of energy consumption in new and renovated buildings, the installation of energy-efficient equipment, the installation of metering devices and the mandatory labeling of buildings. Apart from that, a special programme on harmonisation and implementation of European technical standards in the construction sector is being implemented.

However, energy efficiency measures in buildings are still lagging behind the measures implemented in developed countries. This is due to the non-obligatory nature of many federal standards on energy efficiency in buildings, and the lack of transparent monitoring of the use of energy efficient materials and technologies. In addition, government policy on mandatory energy auditing in buildings almost completely failed. In Russia, there are no buildings with net-zero energy consumption.

In the industrial sector energy efficiency policy is almost completely absent and far behind developed countries. The government did implement some measures, namely first, an energy audit and preparation of an 'energy passport', and second, the adoption of a national energy management standard on the basis of international standard ISO 50001. However, current Russian legislation does not compel or incentivise companies to implement energy management systems. In addition, the lack of long-term financial funding for small and medium-sized enterprises and the lack of an energy services market also do not stimulate industrial companies to increase energy efficiency.

Of the IEA measures on energy efficiency in the transport sector, Russia applies very few. Firstly, there is a shift going on from gasoline and diesel to natural gas in light vehicles and public transport. Secondly, Russia has applied the Euro-3 standard for fuel and the Euro-4 emission standard for vehicles. But in Russia there are no regulations and measures aimed at improving the performance of non-engine components (tyres, air conditioning, lighting); promoting and implementing eco-driving; and increasing the overall energy efficiency of national, regional and local transport systems.

In lighting, the majority of the IEA recommendations has been implemented in Russia. Since 2011 there is a ban on the sale of 100 Watt incandescent bulbs. The market of energy efficient bulbs is growing though incandescent bulbs still prevail. To enhance the current trend, a further ban on sale of 75 and 25 Watt incandescent bulbs will be implemented.

Legislative regulation on energy efficiency in appliances and equipment was improved significantly in the past years. Based on EU legal practices, mandatory equipment labeling and

energy efficiency classes were established. However, mandatory labeling is often not implemented and rigorous monitoring is lacking.

Russia's huge energy-saving potential offers excellent opportunities for the EU-Russia cooperation in the sphere of energy efficiency. Besides, energy efficiency is a less sensitive and politicized issue between Russia and the EU than, for example, gas. In this respect, energy efficiency programs are an excellent opportunity to increase mutual bilateral trust between Russia and the EU and tighten the links between Russian and European companies.

Rising prices for electricity increase the attractiveness and profitability of projects for foreign investors. At the same time, the increase in prices will force Russian companies and the general population to think about energy efficiency. Consequently, European solutions and know-how will be in great demand. In addition, the need to improve energy efficiency in companies will also increase the demand for European technologies and equipment in the Russian market.

A lack of necessary statistical data is a serious impediment to energy efficiency in Russia. Thus, the EU experience in establishing effective data collection systems is indispensable for Russia.

Bilateral projects between Russia and EU countries mostly face problems such as an incomplete legal basis, administrative and technological issues, and difficulties in negotiations with municipal and regional authorities. However, due to public-private partnerships or project-financing mechanisms, it is possible to avoid or to diminish the impact of such problems.

## 2. INTRODUCTION

In 2009, Russia was ranked last in the implementation of the IEA's 25 recommendations on energy efficiency. The situation began to change when Dmitry Medvedev as President of Russia in 2008 set a target to reduce energy intensity of Russian GDP by 40% by 2020. Following this decree, in 2009 the Federal Law on Energy Efficiency and in 2010 the state programme on energy savings were adopted. These documents created a legal basis for the implementation of energy efficiency policy in Russia and established key objectives and target indicators in different sectors of the economy. However, the government measures were mostly focused on state-funded organisations and residential buildings, lighting and appliances while such sectors as industry and transport were hardly covered by the programme at all.

Following the Federal Law on Energy Efficiency more than seventy regulations and standards regulating energy saving and energy efficiency were adopted. While developed countries spent several decades to develop the appropriate legal basis and mechanisms to improve energy efficiency, Russia has tried to do the same job in just 2-3 years. The rush in legal development and the lack of discussions with the expert community had a negative impact on the quality of adopted documents, which required numerous amendments and thus hindered the progress of energy efficiency in Russia.

## 3. BUILDINGS

The buildings sector (including residential and services) accounted for 32% of Russian final energy consumption in 2011, making it the second largest energy end-use sector after industry but having the greatest energy-saving potential, equal to 77.4 mtoe<sup>(1)</sup>. 'Most of the energy is used for space and water heating. The combined share of energy used for cooking, appliances and lighting is estimated to be less than 20%'<sup>(2)</sup>. There has been a steady increase in energy consumption in this sector, primarily as a result of high losses. For example, 70% of the heat produced does not reach the consumer, with 40% losses occurring during transmission and 30% directly in buildings<sup>(3)</sup>. Thus, energy consumption in buildings could be reduced by two-thirds by cutting back on the heating of spaces and water<sup>(4)</sup>. A good example is a project led by the World Bank in which 650 buildings in Cherepovets were renovated in the late 1990s. This showed that it was possible to reduce heat demand by 45%<sup>(5)</sup>.

<sup>1</sup> Bashmakov, I., *Energy Efficiency Increase in Russian Industry*, CENef, Moscow, 2013, p. 14.  
[http://www.cenef.ru/file/UK\\_1\\_01.pdf](http://www.cenef.ru/file/UK_1_01.pdf)

<sup>2</sup> *World Energy Outlook*, IEA, Paris, 2011, p. 279.

<sup>3</sup> *Current Aspects of Energy Efficient Buildings in Russia*, UNDP/GEF, 2011, p.5.  
<http://www.undp.ru/index.php?cmd=publications1&iso=RU&lid=2&id=136>

<sup>4</sup> *Energy Efficiency in Russia: Untapped Reserves*, World Bank/IFC, 2008, p.39-41.

[http://www.ifc.org/wps/wcm/connect/400e24004b5f69148d21bd6eac26e1c2/Final\\_EE\\_report\\_engl.pdf?MOD=AJPERES](http://www.ifc.org/wps/wcm/connect/400e24004b5f69148d21bd6eac26e1c2/Final_EE_report_engl.pdf?MOD=AJPERES)

<sup>5</sup> *Lights Out? The Outlook for Energy in Eastern Europe and the Former Soviet Union*, World Bank, Washington, 2012, p.54. [http://siteresources.worldbank.org/ECAEXT/Resources/258598-1268240913359/Full\\_report.pdf](http://siteresources.worldbank.org/ECAEXT/Resources/258598-1268240913359/Full_report.pdf)

Despite the huge potential for energy savings, the market of energy efficient equipment and technologies was limited in the past by low domestic electricity tariffs. Up to 2007, the cost of construction in Russia was only 20-30% lower than on international markets, while domestic tariffs for energy resources were 6-7 times lower. However, in the last few years, there has been a rise in tariffs for electricity by more than 45% and for gas by more than 60%, which has significantly increased the attractiveness of energy efficiency measures<sup>(6)</sup>.

**Mandatory building energy codes and minimum energy performance.** The Federal Law on Energy Efficiency established requirements to update building codes on energy efficiency standards for new buildings at least once every five years. The law also introduced mandatory labeling of buildings and established a target for reducing energy consumption in public buildings annually by 3%<sup>(7)</sup>.

The Ministry for Regional Development establishes and specifies requirements for the construction sector, building technologies and materials. It also requires the reduction of energy consumption in new buildings by at least 15% in 2011-2015, by 30% in 2016-2019, and by 40% from 2020<sup>(8)</sup>.

Also, the National Association of Builders of Russia on behalf of the Russian Ministry for Regional Development has prepared and is implementing a comprehensive programme on the harmonisation of Russian and European regulations in the construction industry. The programme is developed on the basis of European guidance in the form of 'Implementation and Use of Eurocodes' and provides the use of European standards in the construction sector of Russia<sup>(9)</sup>. At present, there are over 230 standards in construction, based on international and European documents<sup>(1)</sup>.

**Aiming for net-zero energy consumption in buildings.** Presently, in Russia there are no buildings with zero energy consumption. The legislative basis in this sphere is also lacking. There are several buildings with low energy consumption, for example, an energy-efficient house, built in Moscow and a 'Green' house built near Moscow<sup>(11)</sup>. Construction of buildings with net-zero energy consumption in Russia is considered to be more expensive than in Europe. According to experts' estimations, construction costs may be two-three times higher, making it unprofitable with low prices for electricity. Consequently, what construction companies offer consumers as energy-efficient buildings are buildings of higher quality with lower energy and water consumption (10-30% lower than in standard houses).

In energy neutral housing construction, the EU experience would be very useful for Russia. 'Several Member States have already set up long-term strategies and targets for achieving low energy standards for new houses. For example, in the UK the ambition is to have

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<sup>6</sup> *Current Aspects of Energy Efficient Buildings in Russia*, UNDP/GEF, 2011, p.5.

<sup>7</sup> Federal Law N261, *Energy saving and energy efficiency increase*, Government of Russia, Government of the Russian Federation, adopted 26.11.2009. <http://www.rg.ru/2009/11/27/energo-dok.html>

<sup>8</sup> Decree N 262, *On Energy Efficiency Requirements to Buildings and Constructions*, Federal Ministry for Regional Development, 28.05.2010. <http://www.garant.ru/products/ipo/prime/doc/12076199/>

<sup>9</sup> *Current Aspects of Energy Efficient Buildings in Russia*, UNDP/GEF, 2011, p.5-6.

<sup>1</sup> Pugachev, S., *The Use of International and European Standards in Construction Sector*, National Association of Builders of Russia, 19.07.2011. <http://www.nostroy.ru/sitePage.do?name=leftmenu0&id=4>

<sup>11</sup> Gorshkov, A., 'Technology and Organization of the building with zero energy consumption', in: *Construction of Unique Buildings and Structures*, 2013, N3(8).

[http://unistroy.spb.ru/index\\_2013\\_08/2\\_gorshkov\\_derunov\\_zavgorodnij\\_08.pdf](http://unistroy.spb.ru/index_2013_08/2_gorshkov_derunov_zavgorodnij_08.pdf)

zero carbon homes by 2016. In France all new buildings by 2020 should be energy positive'<sup>(12)</sup>. Germany and Austria accounted for 17,000 low energy houses in 2009 alone.

**Improving energy efficiency of existing buildings.** The Federal Law on Energy Efficiency requires mandatory energy audits only for state-funded organisations, not for residential buildings. All energy audits should have been undertaken by 31 December 2012 and should have led to the drawing up of 'energy passports'. But since most organisations had no experience in completing an energy passport, they just copied the information from each other. Consequently, of 38,000 energy passports submitted, only 2,000 were considered by the Ministry for Energy to have been well-done – that is 5 percent<sup>(13)</sup>. The problem of energy audits and passports is linked to the lack of qualified energy auditors. Since the Federal Law on Energy Efficiency was approved, about 20,000 energy auditor diplomas have been issued. The qualifications for a licence are low: to obtain a diploma, one needs simply to pass a 72-hour course, which is offered by a number of companies. This had led to a great increase of poorly qualified auditors and to low prices for audits with a corresponding decrease in quality.

The Federal Law on Energy Efficiency also requires a reduction in energy consumption at state-funded organisations by 3% per year for five years<sup>(14)</sup>. The first problem with this law is that the organisations are monitored on an annual basis. If they reduce energy consumption by 15% in the first year, they still have to reduce consumption by 3% each year in the following years. The second problem is that the requirement for an annual reduction of energy consumption by 3% is applied both to old and new buildings, without taking into account whether there is a reduction potential at a new building or not<sup>(15)</sup>.

The Ministry for Regional Development establishes requirements for energy efficiency in buildings including energy consumption per square meter. It also requires the reduction of energy consumption in renovated buildings by at least 15% starting from 2016 and by 15% more starting from 2020<sup>(16)</sup>.

The Federal Law on Energy Efficiency also establishes requirements to equip all state-funded organisations and residential buildings with metering devices for electricity, heat, water, and gas.

**Building energy labels or certificates.** According to the decree by the Federal Ministry for Regional Development, an energy efficiency class should be established for all new and renovated buildings and can range from A to E<sup>(17)</sup>. However, it is not established what such an energy certificate should exactly measure nor is the procedure for issuing certificates established. Comparing the norms for energy and heat consumption for buildings in Russia and in Germany, it is clear that in Germany stricter regulations are applied. The difference between Russia and Germany for energy consumption in buildings will most likely be a factor of 2.5 by

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<sup>12</sup> *Low Energy Buildings in Europe: Current State of Play, Definitions and Best Practices*, European Commission, 25.09.2009, Brussels, p.9. [http://ec.europa.eu/energy/efficiency/doc/buildings/info\\_note.pdf](http://ec.europa.eu/energy/efficiency/doc/buildings/info_note.pdf)

<sup>13</sup> 'Amendments to the Federal Law on Energy Efficiency Increase', State Informational System on Energy Efficiency Increase, 23.01.2013. [http://gisee.ru/news/events\\_top/43131/](http://gisee.ru/news/events_top/43131/)

<sup>14</sup> Federal law N261, *Energy saving and energy efficiency increase*, Government of Russia, adopted 26.11.2009.

<sup>15</sup> Bashmakov, I., *Comparison of Russian Measures on Energy Efficiency with Measures implemented by the Developed Countries*, CENef, Moscow, 2012, p.20.

<sup>16</sup> Decree N 262, *On Energy Efficiency Requirements to Buildings and Constructions*, 28.05.2010.

<sup>17</sup> Decree N 262, *On Energy Efficiency Requirements to Buildings and Constructions*, 28.05.2010.

2020<sup>(18)</sup>.

**Improved energy performance of building components and systems.** Federal law N262 requires all new and renovated buildings to be provided with energy efficient equipment, including, for example, heating appliances, thermostats, and lifts<sup>(19)</sup>.

Assessing the first results of these measures, it is possible to conclude that due to the active state policy in this sector, energy consumption was decreased in state-funded organisations by 14% and in residential buildings by 6.5% in 2008-2011. Besides, equipment with metering devices has increased by 40% since 2007<sup>(2)</sup>.

However, despite certain successes in this sector, there are still considerable barriers to improved energy efficiency in buildings. They are related to the non-obligatory nature of many federal standards on energy efficiency in buildings, and the lack of transparent monitoring of the use of energy efficient materials and technologies. In addition, low electricity and gas tariffs in comparison to the EU countries make the projects on energy efficiency increase in buildings unprofitable.

Another serious problem hindering energy efficiency is the lack of necessary statistical data. For example, there is no information on total energy consumption of different means of transport, energy consumption in residential buildings and state-funded organisations and the number of energy efficiency appliances being sold<sup>(21)</sup>.

Comparing the number of energy efficiency measures in buildings in the EU in the framework of the EU MURE project to those implemented in Russia, it is clear that in Russia fewer measures have been taken than for example in Germany, the UK, France. It should also be noted that in many EU countries 'white certificates' as well as certification of buildings for energy efficiency classes and specific emission limits of greenhouse gases are either planned or have already been launched. For example, 'Poland implemented the White Certificate system, as a horizontal measure, established by Energy Efficiency Law in 2011. The system will work similarly to the existing green and red certificates'<sup>(22)</sup>. Germany has included in its revised Energy Saving Ordinance of 2012 the climate neutral building standard which should be met by new buildings by 2020<sup>(23)</sup>.

#### 4. INDUSTRY

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<sup>18</sup> Koval, S., 'To the Plans on Energy Efficiency Increase in Buildings in the EU and Russia', *Portal-Energo*, 21.03.2012. <http://portal-energo.ru/articles/details/id/479>

<sup>19</sup> Decree N 262, *On Energy Efficiency Requirements to Buildings and Constructions*, 28.05.2010.

<sup>2</sup> Bashmakov, I., *Target Indicators Assessment of the State Programme on 'Energy Savings and Increased Energy Efficiency in the period to 2020*, CENef, Moscow, 2012, p.10. <http://www.cenef.ru/file/Indicators.pdf>

<sup>21</sup> *Development of Energy Efficiency Indicators in Russia*, IEA, 2011, p.10.

<sup>22</sup> *Energy Efficiency Policies and Measures in Poland*, ODYSSEE-MURE, Warsaw, October 2012, p.51. [http://www.odyssee-indicators.org/publications/PDF/poland\\_nr.pdf](http://www.odyssee-indicators.org/publications/PDF/poland_nr.pdf)

<sup>23</sup> *Energy Efficiency Policies and Measures in Germany*, ODYSSEE-MURE, Karlsruhe, 2012, p.46. [http://www.odyssee-indicators.org/publications/PDF/germany\\_nr.pdf](http://www.odyssee-indicators.org/publications/PDF/germany_nr.pdf)

Russian Industry, being a key consumer of electricity (35.3% of total energy consumption<sup>(24)</sup>), possesses an energy saving potential of 114 Mtoe, which is equal to 43% of the total energy consumption in the industry sector. Industry also accounts for 22% (240 million tons of CO<sub>2</sub> equivalents) of the whole potential greenhouse gas emission reduction in Russia<sup>(25)</sup>. However, despite this huge potential, state policies on energy efficiency in industry are very limited and do not correspond to the IEA recommendations.

**Adoption of energy management protocols (in particular ISO 50001).** In many developed countries standardisation in the field of energy management began about 20 years ago, while Russia took part in plenary meetings on energy management protocols (ISO/TC 242) for the first time only in 2009 with the beginning of the presidential campaign on energy efficiency. In December 2012 national standard GOST R ISO 50001-2012 came into force in Russia<sup>(26)</sup>. This was based on international energy management standard ISO 50001:2011. However, the current Russian legislation neither compels nor encourages organisations to apply the standard and implement the energy management system. Besides, the standard has not been synchronised with the previously accepted standards and legislation, particularly in the use of terminology. For example, the existing regulation does not contain the term 'energy effectiveness' but uses 'indicator of energy efficiency' instead.

**Measures to promote energy efficiency in small and medium-sized enterprises.** A package of measures to promote energy efficiency in small and medium-sized enterprises is lacking. Lack of long-term financial capital is considered to be the main obstacle to the implementation of energy-efficiency projects in Russia. This situation is mostly due to stringent bank policies that offer short-term credit lines with high interest rates. Thus, banks are ready to finance projects up to 5–6 years with interest rates of 13–17 percent in rubles. Under these circumstances, the government should create the necessary conditions to increase the availability of investment resources for businesses using financial instruments such as tax exemptions, accelerated depreciation, target bonds and grants for R&D. The law on energy efficiency contains a number of measures, but they are not sufficient. A possible solution could be equal co-financing of projects by municipal authorities. In this case companies could take smaller loans, the payback period would be shorter and the modernised system would be able to work at least five years without additional investments.

**Minimum energy performance standards for electric motors.** There are no energy efficient standards for electric motors in Russia.

**Complementary financial policies that promote energy-efficient investment.** Again these measures are missing in Russia.

The Federal Law on Energy Efficiency establishes energy audits and the issuing of energy passports by all utilities, energy suppliers and public bodies and authorities as a key energy efficiency measure. Mandatory energy audits are indeed one of the basic and most effective tools to increase energy efficiency. However, in Russia, this process almost completely failed for various reasons, the most important one being that the passports were considered to be a final

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<sup>24</sup> Bashmakov, I., *Energy Efficiency Increase in Russian Industry*, CENEf, Moscow, 2013, p.14.

<sup>25</sup> Bashmakov, I., *Energy Efficiency Increase in Russian Industry*, CENEf, Moscow, 2013, p.14.

<sup>26</sup> Stepanova, M., 'Do we need national standard ISO 50001-2012, establishing energy management standards?', *Academy of Additional Professional Education*, 22.10.2012. <http://academdpo.ru/nuzhen-li-nam-gost-r-iso-50001-2012-ustanavlivayushhij-standarty-energomenedzhmenta/>

goal and the government did not develop any clear further plans on measures to be implemented after the energy audits were made and the passports were issued.

It is not surprising, then, that 18 out of 33 target indicators in industry established by the federal programme on energy efficiency were not achieved. Moreover, on six indicators the situation even deteriorated in comparison to the base year of 2007. As a result, the energy intensity of industrial production increased compared to 2007<sup>(27)</sup>.

Legislation in the United States and Europe pays much more attention to energy saving in industry. Analysis of the number of policies applied in EU industry shows that in Germany 30 policy measures are applied, in France — 15, the UK — 20, the Netherlands —7. In total, as of January 2012, the MURE<sup>(28)</sup> database contained a total of 289 industry measures, out of which 183 were in operation<sup>(29)</sup>. As a key element of policies on energy efficiency in industry, in the EU financial measures and voluntary agreements remain as the core of the policy mix for industry while legislative and fiscal measures are less often implemented. Besides, the role of information measures such as energy audits, information campaigns and training has grown in the EU.

The EU experience illustrates very well that even the use of international energy management standards by the companies should be accompanied by appropriate incentive mechanisms. Significant are, for example, the experiences of Ireland, Sweden and Denmark in implementation of the standard EN 16001 (2009). All three countries introduced so-called voluntary or long-term agreements with industry to promote systematic energy management practices. What all three agreements had in common was that companies were reimbursed for the implementation of the standardised energy management system (EnMS 16001) in the form of lower energy or carbon taxes. Although the details of the approaches differed in the countries, all three cases were successful<sup>(3)</sup>.

One example of voluntary agreements between the government and the business community in Russia was a package of measures which came into force in January 2009, which was aimed at reducing air pollution from gas flaring. The measures concerned primarily large companies such as Bashneft, Tatneft, Surgutneftegas, Rosneft and Gazprom. At the beginning of 2012, the prescribed levels of effective utilisation of associated gas were reached only by Surgutneftegas and Tatneft. On average, during the first three years of the programme, the share of gas fired in flares decreased from 84.1% to 76%, not a very impressive result. Therefore, in 2012 the government adopted a package of additional economic incentives to reduce gas flaring, which involved higher penalties for any emissions from flaring more than 5% of the whole volume of extracted gas<sup>(31)</sup>.

In the mid-term the improvement of energy efficiency in industry will mostly depend on

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<sup>27</sup> Bashmakov, I., *Target Indicators Assessment of the State Programme on 'Energy Savings and Increased Energy Efficiency in the period to 2020*, CENef, Moscow, 2012, p.10-11. <http://www.cenef.ru/file/Indicators.pdf>

<sup>28</sup> MURE (Mesures d'Utilisation Rationnelle de l'Energie) provides information on energy efficiency policies and measures that have been carried out in the Member States of the European Union.

<sup>29</sup> *Energy Efficiency Policies in Industry: Lessons Learned from the ODYSSEE-MURE Project*, ADEME, September 2012. <http://www.odyssee-indicators.org/publications/PDF/Industry-policies-brochure.pdf>

<sup>3</sup> *IEA Energy management programs for industries*, IEA, 2012, p.50.

<http://www.iea.org/publications/freepublications/publication/policypathwaysindustry.pdf>

<sup>31</sup> Decree N1148 № 1148, *On peculiarities of calculating charges for Emissions from combustion gas in flares and/or dissipation of associated gas*, Government of the Russian Federation, 08.11.2012.

the introduction of new machinery and technologies, 'as existing industrial assets reach the end of their useful life'<sup>(32)</sup>. In turn the speed of this turnover partly depends on energy prices. As in the mid-term the prices for electricity are expected to rise<sup>(33)</sup>, Russian companies, competing on international markets, will start to lose their competitiveness if they do not take measures, especially energy-intensive industries such as metallurgy and the extraction industries. However, a mere increase in electricity prices is not a sufficient factor to stimulate companies to invest in new technologies. The logic behind mandatory energy audits and energy passports was to show the potential of energy saving opportunities and to encourage companies to invest in new technologies. This has not been successful, as the energy services market remains undeveloped and there is a lack of long-term financial mechanisms.

## 5. TRANSPORT

According to the estimates of the International Energy Agency, the transport sector in Russia is in fourth place in energy savings potential, after buildings, the electricity and heating sector, and industry<sup>(34)</sup>. The transport sector accounts for 21% of final energy consumption (90 Mtoe)<sup>(35)</sup>. According to estimates by the Center for Energy Efficiency, the total potential for energy savings in the transport sector is equal to 30.5 million Mtoe<sup>(36)</sup>. Moreover, according to the IEA prognosis, 'energy demand in the transport sector of Russia is projected to continue to grow at the fastest rate, albeit at a slower pace, averaging 1.3% per year'<sup>(37)</sup>.

Indeed, in the last decade, Russia has experienced a steady growth of road transport. The vehicle park grew from 31 million vehicles in 2005 to 47.9 million in 2013<sup>(38)</sup>. The share of light vehicles accounts for nearly 81%, that is 38.8 million cars<sup>(39)</sup>. The increase in car ownership has led to a significant decrease in the energy efficiency of passenger transport. Fuel consumption increased in Russia in parallel with the increase in the number of vehicles. Car fuel consumption is the major factor that contributed to the increase of primary energy consumption in the last decade. In 2005 Russian vehicles consumed 50.9 million tons of fuel<sup>(4)</sup>, in 2011 this was 62.5 million tons<sup>(41)</sup>. More than 70% of the fuel is being consumed in the European part of Russia.

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<sup>32</sup> *World Energy Outlook*, IEA, Paris, 2011, p.276.

<sup>33</sup> *Forecast of socio-economic development of the Russian Federation for the period 2013-2015*, Ministry for the Economic Development of the Russian Federation adopted 14.12.2012.

<http://www.economy.gov.ru/minec/activity+++++++/sections/macro/prognoz/index>

<sup>34</sup> *World Energy Outlook*, IEA, Paris, 2011, p.277.

<sup>35</sup> *World Energy Outlook*, IEA, Paris, 2011, p.277.

<sup>36</sup> Bashmakov, I., 'Energy Efficiency Increase in Transport Sector', *CENEf/ABOK*, 2010.

[http://www.abok.ru/for\\_spec/articles.php?nid=4500](http://www.abok.ru/for_spec/articles.php?nid=4500)

<sup>37</sup> *World energy outlook*, IEA, Paris, 2011, p.278.

<sup>38</sup> 'The park of auto transport in Russia', *Russian Federal State Statistics Service*, 2008.

[http://www.gks.ru/bgd/regl/B09\\_55/lssWWW.exe/Stg/02-28.htm](http://www.gks.ru/bgd/regl/B09_55/lssWWW.exe/Stg/02-28.htm)

<sup>39</sup> 'Russian Car Market 2013', *AutoStat Analyticals*, 30.04.2013, p.2. <http://www.autostat.ru/catalog/product/146/>

<sup>4</sup> *Energy Efficiency in Russia: Untapped Reserves*, World Bank/IFC, 2008.

<sup>41</sup> 'The park of auto transport in Russia', *Russian Federal State Statistics Service*, 2008.

[http://www.gks.ru/bgd/regl/B09\\_55/lssWWW.exe/Stg/02-28.htm](http://www.gks.ru/bgd/regl/B09_55/lssWWW.exe/Stg/02-28.htm)

Of the IEA recommendations on energy efficiency in transport, Russia has followed two: there is a shift from gasoline and diesel to natural gas in light vehicles and public transport, and Russia has applied the Euro-3 standard for fuel and the Euro-4 emission standard for vehicles.

**Mandatory vehicle fuel efficiency standards. Measures to improve vehicle fuel efficiency.** Starting from January 2013 in accordance with the requirements of technical regulations<sup>(42)</sup> a new environmental standard for gasoline and diesel fuel, Euro-3, came into force. The Euro-4 standard is expected to be applied from 2015, and Euro-5 from 2016. In the EU Euro-4 standard was already in force in 2005, since 2009 only the Euro-5 standard is allowed, and from 1 September 2014 the Euro-6 standard will come into force<sup>(43)</sup>. The reasons for Russia's lagging behind the EU are numerous. For one thing, the oil companies have fallen behind in the modernisation of refineries. At the same time, the same oil companies have repeatedly argued that the cars produced in Russia can only handle the Euro-3 fuel standard. However, the real reason seems to be rather that the oil companies prefer to invest in the expansion of their facilities and the construction of new refineries, not in the modernisation of old ones.

**European emission standards for vehicles.** In order to protect the public and the environment from exhaust emissions, a special technical regulation was adopted in 2005. It implied that only cars complying with Euro-4 standard should be imported and produced in Russia starting from January 2010. But then, amendments were made and the shift to the Euro-4 emission standard occurred only in January 2013. Despite the adoption of the new standard, vehicles produced before 31 December 2012 can still be used with Euro-3 certificates<sup>(44)</sup>.

**Fuel-efficient non-engine components. Eco-driving. Transport system efficiency.** In Russia there are no regulations and measures aimed at improving the performance of non-engine components (tyres, air conditioning, lighting); promoting and implementing eco-driving; and increasing the overall energy efficiency of national, regional and local transport systems.

Thus, in Russia there are very few measures promoting efficiency in the transport sector. As a result, none of the four target indicators in the transport sector established by the federal programme on energy efficiency has been achieved so far. Moreover, some indicators even became worse in comparison to the base year (2007)<sup>(45)</sup>.

The situation is aggravated by the fact that there are no data on total energy consumption in the transport sector in Russia, and data on energy consumption by different transport modes is very scanty. This partly explains why energy efficiency policies in the

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<sup>42</sup> Technical regulations *On Requirements to automobile and aviation gasoline, diesel and marine fuel, jet fuel and heating oil*, Government of the Russian Federation, adopted 16.04.2012. [http://www.nge.ru/g\\_regl.htm](http://www.nge.ru/g_regl.htm)

<sup>43</sup> *On type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information*, Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007. [http://europa.eu/legislation\\_summaries/environment/air\\_pollution/l28186\\_en.htm](http://europa.eu/legislation_summaries/environment/air_pollution/l28186_en.htm)

<sup>44</sup> Governmental Decree N2, *Amendments to Paragraph 13 of Technical Regulations 'Requirements to the Release pollutant gases by automotive vehicles, produced in the Russian Federation*, Government of the Russian Federation, adopted 20.01.2012. <http://base.consultant.ru/cons/cgi/online.cgi?req=doc;base=LAW;n=125455;fld=134;dst=100005;rnd=0.8007121422041215>

<sup>45</sup> Bashmakov, I., *Target Indicators Assessment of the State Programme on 'Energy Savings and Increased Energy Efficiency in the period to 2020*, CENef, Moscow, 2012. <http://www.cenef.ru/file/Indicators.pdf>

transport sector are few and far between.

However, despite the lack of incentive mechanisms and appropriate legislative framework, in the mid- and long-term, we may expect to see an energy efficiency increase in the transport sector for the following reasons. Firstly, Russia is increasing the number of vehicles running on liquefied petroleum gas. In 2011 in Russia there were 1.4 million such vehicles accounting for 3.5% of the total auto park. In 2012, Prime Minister Medvedev signed a governmental decree, according to which 50% of public transport should shift from gasoline and diesel to liquefied petroleum gas<sup>(46)</sup>. According to IEA estimates, 'natural gas use in road transportation will increase by an average of 13% per year'<sup>(47)</sup> in Russia. Undoubtedly, this is extremely beneficial for Gazprom and other gas companies, as domestic demand for gas will increase as a result. At the same time, the use of liquefied petroleum gas promotes energy efficiency and reduces greenhouse gas emissions by more than 25%.

Secondly, Russian consumers increasingly prefer to buy foreign autos, which tend to be more energy efficient. In 2012, the share of foreign cars sold in Russia was 2.18 million out of 2.76 million, that was a record for the past 7 years. 'Best sellers' are Chevrolet, Renault, KIA, Hyundai, and Volkswagen<sup>(48)</sup>. The expected reduction of import duties within the WTO will only strengthen this trend. Thus, developed countries indirectly contribute to energy efficiency in the transport sector of Russia.

The EU experience in the field of energy efficiency in transport can be valuable and useful for Russia. In 2009 the European Union adopted CO<sub>2</sub> emission regulations for passenger cars with implementation to be phased in over 2012-2015<sup>(49)</sup>. However, as the EU experience showed, the greatest success in influencing consumers' vehicle purchasing behavior can be achieved with fuel economy and CO<sub>2</sub> emission labeling combined with fiscal initiatives, as for example in the Netherlands and the UK<sup>(5)</sup>. In addition, the way information is presented is also important: a customer may be impressed by savings related to annual fuel costs buying a certain type of vehicle<sup>(51)</sup>. In the Russian context, the use of labeling is advantageous to vehicles on alternative fuels and hybrid cars, as customers clearly see the savings.

Another important way to improve energy efficiency is eco-driving training. 'Eco-driving can essentially improve on-road fuel efficiency and CO<sub>2</sub> emissions. Besides, this can also contribute to better safety, and reduced noise and stress'<sup>(52)</sup>. Eco-driving programmes have been implemented in many developed countries, for example, in Austria, Germany, Sweden, Japan and others. Their experience shows that eco-driving results in average fuel economy improvements of between 5% and 15% for cars, buses and trucks in the first three years and

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<sup>46</sup> Agamalova, A., 'Medvedev enacted to shift the half of public transport to gas', *Vedomosti*, 13.05.2013.

[http://www.vedomosti.ru/companies/news/11950941/medvedev\\_postanovil\\_perevesti\\_polovinu\\_obschestvennogo](http://www.vedomosti.ru/companies/news/11950941/medvedev_postanovil_perevesti_polovinu_obschestvennogo)

<sup>47</sup> *World Energy Outlook*, IEA, Paris, 2011, p.278.

<sup>48</sup> 'Foreign Cars in Russia. Results of 2012 and perspectives', *AutoStat Analytics*, 20.03.13, p.2-3.

<http://www.autostat.ru/catalog/product/144/>

<sup>49</sup> *Transport Energy Efficiency; Implementation of IEA Recommendations since 2009 and next steps*, IEA, 2010, p.8.

[https://www.iea.org/publications/freepublications/publication/transport\\_energy\\_efficiency.pdf](https://www.iea.org/publications/freepublications/publication/transport_energy_efficiency.pdf)

<sup>5</sup> *Transport Energy Efficiency; Implementation of IEA Recommendations since 2009 and next steps*.

<sup>51</sup> *Transport Energy Efficiency; Implementation of IEA Recommendations since 2009 and next steps*.

<sup>52</sup> *Transport Energy Efficiency; Implementation of IEA Recommendations since 2009 and next steps*, IEA, 2010, p.39.

around 5% afterwards<sup>(53)</sup>.

Finally, Russia could take into consideration the EU experience in programmes stimulating scrappage of old cars. Despite the programmes on concessional car loans and on scrappage of old vehicles, implemented in 2010, presently in Russia out of nearly 39 million light vehicles, 49.9% are over 10 years old. To stimulate the utilisation of old cars, it is necessary to implement additional programmes, giving subsidies or certificates for fuel.

## 6. LIGHTING

Most of the IEA recommendations on energy efficiency in lighting have been adopted in Russian legislation.

**The IEA recommends governments to phase out inefficient lighting products and systems and promote improved systems design and management.** The Federal Law on Energy Efficiency establishes a ban on the sale of 100 Watt incandescent bulbs starting from January 2011. But the implementation of this ban has turned out to be quite weak. Many manufacturers started to produce 95 and even 99 Watt bulbs in circumvention of the law. In 2013 a ban on the sale of 75 Watt incandescent bulbs, and in 2014 — a ban on 25 Watts incandescent bulbs is expected to come into force.

In recent years, despite the fact that incandescent bulbs still prevail on the market, the sales of energy saving lamps have been steadily increasing. In 2012 the sales volume of LED lamps increased by 100% (from 13 million to 26 million items), compact fluorescent lamps by 25%, and halogen lamps by 66%. However, two-thirds of compact fluorescent lamps sold in 2012 were in the price range of 1.5-2.5 Euros, had bad quality and therefore quickly broke down, without providing proper energy conservation<sup>(54)</sup>. Further introduction of the ban on the sale of 75 and 25 Watt incandescent bulbs will stimulate the purchase of energy saving bulbs.

The Federal Law on Energy Efficiency also establishes requirements to reduce energy consumption in public buildings by 3% annually. This goal will partly be achieved through the installation of energy saving lamps and lighting control systems. In 2007-2011 energy consumption in state-funded organisations has been reduced by 14% as a result of energy efficiency measures in lighting<sup>(55)</sup>.

It is important to add that a number of governmental and various ministerial decrees establish requirements to equip all new and renovated buildings with energy efficient lighting and automatic lighting control systems<sup>(56)</sup>; set energy efficiency requirements for electric lamps<sup>(57)</sup>; and require the purchasing of only energy efficient illuminating equipment by state

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<sup>53</sup> *Transport Energy Efficiency; Implementation of IEA Recommendations since 2009 and next steps.*

<sup>54</sup> Borovkov, S. 'Key Trends on the Russian Market of Lamps', Presentation, *Lighting Business Consulting*, 23.07.2013.

<sup>55</sup> Bashmakov, I., *Target Indicators Assessment of the State Programme on 'Energy Savings and Increased Energy Efficiency in the period to 2020*, CENef, Moscow, 2012, p.14. <http://www.cenef.ru/file/Indicators.pdf>

<sup>56</sup> Decree N 262 *On Energy Efficiency Requirements to Buildings and Constructions*, Federal Ministry for the Regional Development, 28.05.2010.

<sup>57</sup> Decree N357 *On Approval of Regulations for Producers and Importers to define energy efficiency class of goods*, Federal Ministry for Industry and Trade, 29.04.2010.

and municipal organisations<sup>(58)</sup>.

However, Russian measures on energy efficiency in lighting are still lagging behind the measures implemented in developed countries. For example, in the EU household bulbs that do not meet energy efficiency requirements are gradually being phased out in 2009-2012. The incandescent bulbs of 40 Watt and under have been phased out starting from September 2012. In addition, frosted bulbs and high-energy halogen lights are also being phased out. It is also important to mention Ecodesign Directive which sets requirements on energy-related products, including lighting products in the EU. Therefore, it is expected that by 2020 these measures will reduce emissions of carbon dioxide by 15 million tons each year and will decrease electricity consumption in the EU countries by 3-4%<sup>(59)</sup>.

## 7. APPLIANCES AND EQUIPMENT

**In this area the IEA recommends mandatory minimum energy performance standards and labels, energy performance test standards and measurement protocols, and complementary market transformation policies.**

In the past few years, legislative regulation of energy efficiency for appliances and equipment has been seriously improved in the Russian Federation. First of all, it was decided to establish classes of energy efficiency and equipment labeling. These classes and labeling were borrowed from the European Union. The Federal Law on Energy Efficiency obliges producers to indicate the class of energy efficiency and a governmental decree defines the list of goods that must undergo energy efficiency class identification<sup>(6)</sup>.

On the Russian market the share of imported household appliances is over 50%. However, the share of equipment with high energy efficiency is very limited, since such products are significantly more expensive than equipment of similar class in Europe. Analysis of state measures in the area of labeling and energy efficiency classes shows that more than half of household appliances are either unmarked, or their energy efficiency class is unknown by owners. This indicates that the legal requirement for mandatory labeling is not adequately implemented since there is no control or any penalty for nonfulfillment.

In contrast to the EU countries, in Russia there are no government programmes stimulating a purchase of appliances with a high class of energy efficiency. For example, in Germany, Spain and Holland government programmes envisage direct subsidies whereas in Great Britain and Italy tax exemptions are offered.

Besides, in some developed countries, for example in South Korea and Australia, labeling of appliances is mandatory for a wider range of products and includes also greenhouse emissions labelling requirements<sup>61</sup>.

<sup>58</sup> Decree N1221 *On Approval of Rules establishing energy efficiency requirements for goods, works, and services for public and municipal needs*, Government of the Russian Federation, 31.12.2009.

<sup>59</sup> *Energy-saving light bulbs*, European Commission, [http://ec.europa.eu/energy/lumen/faq/index\\_en.htm](http://ec.europa.eu/energy/lumen/faq/index_en.htm)

<sup>6</sup> Decree N1222 *On Types and Characteristics of Goods which should contain information about class of energy efficiency and labelin'*, Government of the Russian Federation, 31.12.2009.

<sup>61</sup> Forbes, Ch., *Summary of Country Reports Submitted to the Energy Efficiency Working Party*, IEA, March-September 2011, p. 6-7.

## 8. CONCLUSIONS

Enactment of the Federal Law on Energy Efficiency in 2009 gave considerable impetus to the development of the legislative framework on energy efficiency in Russia. This has greatly improved the position of Russia in the ranking of countries implementing energy efficiency measures recommended by the IEA. However, the rush in the adoption of the laws has resulted in a bad quality of the rules and required numerous amendments.

The first assessment of the government measures on energy efficiency in 2008-2011 showed that positive results were achieved only in sectors such as state-funded organisations and residential buildings, lighting, appliances and equipment. In industry and transport government measures were very limited and did not bring any positive results. Consequently, out of 89 target indicators established by the state programme on energy efficiency, 47 had not been achieved by 2012. It was also planned to decrease CO<sub>2</sub> emissions by 62 Million Metric Tons by 2012 but de facto it was decreased only by 6.3 Million Metric Tons – that is 10%.

Thus, in spite of considerable efforts and financial resources allocated by the government to the implementation of energy efficiency measures, results have not been very significant. The energy efficiency goals that were established have not been achieved in most sectors.

Government measures on energy efficiency in buildings were partly successful. They led to reduction of energy consumption in new and renovated buildings, the implementation of energy-efficient equipment, the installation of metering devices and mandatory labeling of buildings. Apart from that, a special programme on harmonisation and implementation of European technical standards in the construction sector is being implemented.

However, Russian measures on energy efficiency in buildings are still lagging behind the measures implemented in developed countries. This is due to the non-obligatory nature of many federal standards on energy efficiency in buildings, and lack of transparent monitoring of the use of energy efficient materials and technologies. In addition, government policy on mandatory energy audits in buildings almost completely failed due to the poor qualification of energy auditors. Comparing the number of measures on energy efficiency increase in buildings in the EU and Russia, it is clear that Russia is still far behind the EU. Besides, in Russia there are no buildings with net-zero energy consumption.

In the transport sector state measures on energy efficiency are almost completely absent. There is a shift from gasoline and diesel in light vehicles and public transport and the Euro-3 standard for fuel and the Euro-4 emission standard for vehicles are being applied. But the effects of these developments are limited. In the mid-term a further increase in energy efficiency in the transport sector might be expected due to an increasing number of vehicles running on gas and an increasing share of European and Asian cars.

In the industry sector there is no long-term government policy on energy efficiency. Implemented measures focused on mandatory energy audits and adoption of the national energy management standard based on the international standard ISO 50001. However, current legislation in Russia does not compel or incentivise companies to use this standard. Voluntary or

long-term agreements between the government and business did not find much support among businesses. Thus, Russian energy efficiency measures in industry do not live up to the IEA recommendations. In Europe and in the USA much more attention is paid to this sector.

The majority of the IEA recommendations on energy efficiency in lighting have been implemented in Russia. For example, since 2011 there has been a ban on the sale of 100 Watt incandescent bulbs. However, many producers continue to sell 95 and even 99 Watt incandescent bulbs. Thus, further success in this sphere will depend a lot on the adoption of the ban to sell 75 and 25 Watt incandescent bulbs. However, Russia is still far behind the EU countries in phasing out inefficient bulbs.

Russian energy efficiency measures related to appliances and equipment led to the introduction of energy efficiency classes and labeling based on the EU standards and norms. However, these requirements quite often are not fulfilled because there is no mandatory control. Besides, in contrast to the EU countries, in Russia there are no government programmes stimulating a purchase of appliances with a high class of energy efficiency.

## **RECOMMENDATIONS**

Russia's huge energy-saving potential offers excellent opportunities for the EU-Russia cooperation in the sphere of energy efficiency. Russia takes advantage of European technologies, solutions and experiences, and European companies gain from substantial economic benefits and possible spillover effects for upstream cooperation. Besides, energy efficiency is a less sensitive and politicized issue between Russia and the EU than, for example, gas. In this respect, energy efficiency programs are an excellent opportunity to increase mutual bilateral trust between Russia and the EU and tighten the links between Russian and European companies.

Rising prices for electricity increase the attractiveness and profitability of projects for foreign investors. At the same time, the increase in prices will force Russian companies and the general population to think about energy efficiency. Consequently, European solutions and know-how will be in great demand. In addition, the lack of generating capacities in Russia and increasing electricity consumption create excellent opportunities for investments in construction of combined heating/cooling plants and transformer substations.

The need to improve energy efficiency in companies will also increase the demand for European technologies and equipment in the Russian market, since the equipment produce by European companies is more reliable and energy efficient than that of Russian producers.

A lack of necessary statistical data is a serious impediment to energy efficiency in Russia. Over the past years, the International Energy Agency has been developing energy efficiency indicators for each end-use sector to construct a 'big picture' of patterns of energy use. Thus, the EU experience in establishing effective data collection systems is indispensable for Russia.

Bilateral projects between Russia and EU countries mostly face problems such as an incomplete legal basis, administrative and technological issues, and difficulties in negotiations with municipal and regional authorities. However, due to public-private partnerships or project-financing mechanisms, it is possible to avoid or to diminish the impact of such problems.

Russian policy on energy efficiency has been moving slower than the EU had expected.

The process is being slowed by the lack of coherent policies on the federal and regional levels as well as by an insufficient and ill-informed legal basis. The quality and timeliness of the necessary amendments will play a large role in the success or failure of policy on energy efficiency in the following years.

Although the clear commitment at the highest political level in Russia for substantial energy efficiency is widely recognised, it is important to understand that there is no long-term vision of energy efficiency policies and clear understanding of final results.

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