Energy efficiency in Russian Industry

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This report on energy efficiency in Russian industry is written in the framework of the G2G project “Development of recommendations to support base branch of industry by implementation of energy efficiency technologies”. For writing this document we used information from several documents which are documented in the annex References.

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INTRODUCTION

Energy efficiency has received very little attention in Russia. Currently the country spends an estimated 3.5 times more energy than the European average. Recently President Medvedev made several public statements identifying Russia’s inefficient use of energy, and the associated economic and ecological consequences, as one of the most pressing problems facing the nation. He has called for an action plan to halve Russia’s energy intensity by 2020. [1]

Energy efficiency is now high on the political agenda:
- modernizing Russia’s energy infrastructure and promoting energy efficiency is the number one of the five priority areas for modernization established by President Medvedev in June 2009 and overseen by the Presidential Commission for Modernisation and Technological Development of Russia’s Economy.
- Russian energy efficiency goals, set out by the Russian President, will reduce energy intensity of GDP of the Russian economy by 40% to 2020 compared to the 2007 levels. [2]
- relevant for the creation of new high technology businesses, industrial modernization, improvement of the citizens’ living conditions and production of new hi-tech products. [4]


Further to this law, special norms and rules, new technical regulations and a system of environmental standards are to be approved, and current construction requirements must be revised.

The Law includes several elements relevant to the development and implementation of an industrial market transformation programme including provisions for regular energy audits and energy passports for legal entities. Energy passports are to include energy balances, improvement plans and some basic elements of an energy management system standard.

The Department for Basic Branches of Industry of the Ministry of Industry and Trade (MIT) is responsible for a number of heavy industries such as mechanical engineering, metallurgy, electrical and cable industry (including lighting). These large consumers of energy will become obliged to improve their energy efficiency. The MIT is planning to set strict energy efficiency standards and requirements, and effectively monitor their observance. In order to significantly improve energy efficiency, financial incentives have to be developed as well.

The Department for Basic Branches of Industry wanted to study how the industrial sector can be encouraged to increase energy efficiency through government policy and measures (such as financial instruments and the legal framework). The Netherlands is asked to assist MIT in its task to develop this government policy aimed at increasing energy efficiency in the industrial sector by sharing the experience of the Netherlands.

Based on the intended intervention presented above, a project was designed to support MIT with the development of the energy efficiency policy for the basic branches of industry. This project was called “Development of recommendations to support base branch of industry by implementation of energy efficiency technologies”.

This report explains the current situation regarding energy efficiency in Russian industry and is based on the several results of the project.
1. ENERGY CONSUMPTION IN RUSSIAN INDUSTRY

1.1 Russian industry

It has proven to be impossible to find factual data on the number of Russian companies; the one tracked reliable estimation is that the number of economically active companies slightly exceeds 4.5 million (out of a total of 18 million companies and institutions giving employment). 80% of this amount is accounted for by private businesses. Related relevant facts are that 31% of GDP (total 1.5 trillion euro) is generated in industry employing 32% of the labour force (total 76 million). [3]

The Russian industry is represented by the Chamber of Commerce and Industry of the Russian Federation (RF CCI). The RF CCI is a non-governmental, non-profit organization that operates under the Russian Federation Law on Chambers of Commerce and Industry in the Russian Federation and the Chamber's Charter. It represents the interests of small, medium-size, and big businesses encompassing all business sectors - manufacturing, domestic and foreign trade, agriculture, the finance system and services. Federal sector organizations for all industries have been established. Most of these have affiliates on oblast level. [3]

Russia possesses a complete range of mining and extractive industries producing coal, oil, gas, chemicals, and metals; all forms of machine building from rolling mills to high-performance aircraft and space vehicles; defence industries including radar, missile production, and advanced electronic components, shipbuilding; road and rail transportation equipment; communications equipment; agricultural machinery, tractors, and construction equipment; electric power generating and transmitting equipment; medical and scientific instruments; consumer durables, textiles, foodstuffs and handicrafts. [3]

1.2 Energy consumption and energy saving potential in Russia

Factual data from 2005 mention 655 Mtoe of total Russian energy consumption and the same source estimates 685.86 Mtoe for 2010. In 1990 Russia consumed 887 Mtoe, which diminished with one third because of the economic downfall. 46% of this use was accounted for by industry, i.e. 301 Mtoe in 2005 but calculating with 40% industry share for 2010 a use of 274 Mtoe is expected. [3/McKinsey & Company]

Figure 1 Total energy consumption in Russia by type (2005)
The energy intensity of Russia’s GDP is the highest in the world, and although its energy intensity declines, Russia remains among the least energy-efficient economies in the world through 2030. [3]
The expectation is that the newly developed energy efficiency policy will help to improve the before 2020. (see chapter 3)

Russia’s energy saving potential is about 45 percent of its total primary energy consumption. The current energy inefficiency is equal to the annual primary energy consumption of France. Achieving Russia’s full energy efficiency potential would cost a total of $320 billion to the economy and result in annual costs savings to investors and end users of about $80 billion, pay back time is four years. Benefits to the total economy are much higher: $120-150 billion per annum of energy cost savings and additional earnings from gas exports. By realizing its energy efficiency potential Russia can save:

• 240 billion cubic meters of natural gas,
• 340 billion kWh of electricity,
• 89 million tons of coal, and
• 43 million tons of crude oil and equivalents in the form of refined petroleum products. [1]

The largest technical energy efficiency potential can be found in the residential, electricity generation, and manufacturing sectors. Figure 3 presents the energy efficiency potential by sector and indicates what level of the potential is economically attractive and financially viable. As can be seen from Figure 3, the energy efficiency potential in end-use sectors is significantly higher than on the energy supply side. In fact, the financially viable potential in end-use sectors is four times higher than that in electricity and heat supply systems. Moreover, end-use savings are accompanied by an additional decrease in primary energy consumption (94 Mtoe) across the entire energy value chain. For example 1 kWh of reduction of consumption in the residential sector will lead to a 5 kWh reduction in primary supply. In sectors with a high level of financially viable potential (manufacturing and transportation), policy should focus on interventions that do not affect prices or offer subsidies, but remove non-financial barriers. In sectors with a low level of energy efficiency potential (electricity and heat generation), prices should be adjusted accordingly or other fiscal incentives offered to help achieve significant savings. [1]
1.3 Energy efficiency and Russian industry

The relative inefficiency of Russian industry can be attributed to Soviet-era capital stock and abundant and inexpensive domestic energy supplies. The share of natural gas, Russia’s most abundant domestic fuel, in the country’s industrial fuel mix will increase, as will the share of electricity, most of which is provided by natural-gas-fired generation. [3]

The predominance of heavy industry undoubtedly has some impact on a country’s energy consumption. Much of the value of Russia’s economic activity (roughly one-third) comes from heavy industry, which is generally more energy intensive than other economic activities such as agriculture, or wholesale and retail trade. [3]

The power and heat sector in Russia consumes more than half of primary energy. The petroleum and gas industry is the second largest energy consumer of Russia and the first one in industry - an estimated 10% of industry energy consumption; 20% of GDP. The second energy intensive industry sector is the iron and steel industry, consuming 5% of total energy. Chemical production in Russia consumes about 2% of the country’s total primary energy. The number four user is a runner up: the cement industry is developing again back to its post-crisis use due to the building boom in Russia. [3]

Russia can cut its total final energy consumption by roughly 5 percent through investments in energy efficiency in manufacturing. With total consumption of 109.5 Mtoe, manufacturing is the largest energy end-user in Russia, representing roughly 25% of total final energy consumption and 15 percent of total final energy supply. The energy efficiency potential of Russia’s manufacturing sector is estimated at 41.5 Mtoe per year. Energy efficiency potential in manufacturing is concentrated in some activities, and widely distributed in others. On the one hand, the three most energy intensive industries – the ferrous metals, pulp and paper, and cement industries – represent 53 percent of energy saving potential, with 39 percent concentrated in ferrous metals. On the other hand, non-energy intensive industries such as bakeries, meat processing and other represent 42 percent of the potential, and cannot be discounted by policy interventions. Most of the savings can be achieved by improving the efficiency of electricity and heat use at Russia’s manufacturing facilities. [3/McKinsey and IFC]

The incremental investments required are €23 billion and annual energy cost savings for investors/end-users in 2007 prices: €9 billion. [1,3 / McKinsey and IFC]
Although most energy efficiency gains in industry occur through natural replacement (i.e. the purchase of more energy efficient equipment to replace worn out old equipment), there are additional opportunities for savings of about 34,5 Mtoe (4% of total consumption) and a reduction of 200 Mt CO₂e emissions (7% of total emissions). These measures require about €60 billion in investments and would bring €80 billion in savings over twenty years. Energy saving and greenhouse gas abatement in industry do not mean additional costs. On the contrary, in many cases Russian companies could increase their competitiveness by becoming more energy efficient. For example, steel players could reduce their energy consumption by up to 6% by reusing the gas that is emitted in basic oxygen furnaces for power and heat production. [3/McKinsey]

Industry is slow in realizing its energy efficiency potential primarily due to a lack of awareness among managers and insufficient supply of long-term capital to finance energy efficient modernization.

In addition, companies in a number of sectors lack the incentive to save energy because energy tariffs are growing at a slower pace than product prices. Launching targeted information dissemination campaigns and channelling long-term financing for energy efficiency investments through Russian financial institutions will help enterprises realize immediate energy saving opportunities. The continuation of electricity and gas sector reforms is important to maintain the attractiveness of energy efficiency as a business case.” Fiscal instruments such as tax rebates or accelerated depreciation could provide additional incentives in the current context to stimulate investment in new state-of-the-art equipment and management practices to produce competitive goods and services. [1,3]

1.4 Availability of energy efficient technology

Foreign energy efficiency technology is widely available in Russia. However, enterprises have difficulty attracting capital for the introduction of energy efficient technology due to the, in their eyes, relative long payback time of up to ten years. The Russian Minister of Energy, Smatko, announced in early 2009 that the sector for energy efficient technology in Russia requires investments of at least EUR 2,5 billion to develop further. [3]

Unfortunately the Law on Energy Efficiency does not require companies in the industrial sector to use the latest technology. The law does, however, require that the energy efficiency of goods is indicated through indicating the energy class the good belongs to. [3]
2 ENERGY EFFICIENCY IN METALLURGY

(Source presentation Mr. Igor Gonnov)

According to MIT, department of basic branches, energy efficiency is an important topic for the metallurgy sector in the Russian Federation.

Since 1999 33 major projects were implemented with a total investment of RUB 4 billion. The average pay back time of these projects was 3 years (!). Also some 1200 low-cost activities were implemented which resulted in a reduction of RUB 780 million a year.

Due to completed organizational and technical activities and investment projects during the recent 10 years Novolipecky Metallurgichesky Kombinat (NLMK) has achieved 55% of the possible effect of reduction of power consumption to the level of the best available technologies.

NLMK has developed a prospective Energy Efficiency Improvement Program to reach an energy efficiency improvement of 15.4 %, from 6.62 Gcal per ton of steel (2008) to 5.60 Gcal per ton of steel (2020). The program will require an investment of RUB 21.5 billion. Energy consumption will decrease by 1.02 Gcal per ton which equals 1.1 billion cubic meters of natural gas a year.

Major activities in the program are:
- Implementation of pulverized coal fuel injection technology in blast furnaces
- Construction of generation units behind blast furnaces
- Construction of utilization power station for excess blast gas
- Utilization of waste heat from air-heaters of cooled agglomerate
- Construction of collection and utilization complex for converter gas

Energy savings and energy efficiency in metallurgy is one of the key objectives of the Russian Metallurgy Industry Development Strategy until 2020 (approved by MIT on 18 March 2011 (No. 150)). The following measures are foreseen in the strategy:
1. Making a list of priority investment projects in metallurgy to identify the priority projects when providing government support.
2. Zero import duties for the technological equipment that has no equivalents in Russia (the decree includes 91 items of equipment, including 5 for mining and 7 for metallurgy).
3. Zero VAT for imported technological equipment that has no equivalents in Russia.
4. Providing government guarantee for loans to metallurgical enterprises in the amount of RUB 53.4 billion.
5. Together with Vnesheconombank, selecting priority investment projects for financing, and supporting in loan issuance in other banks. There are 6 metallurgical enterprises (Amurmetall, NLMK, Zlatoust plant of metal constructions, Orsk plant of metal constructions, Mechel, Chusovsk metallurgical plant) that are selected.
6. Subsidizing a part of the expenses for interest rates incurred by Russian exporters of industrial products. In 2009, the overall amount subsidized to metallurgical enterprises was RUB 290 million.
7. Tax benefits on profit tax paid by organisations which invest in energy efficient technologies.
8. Tax benefits on property tax paid by organisations implementing energy efficient projects.
9. Providing loans on preferential terms to enterprises implementing energy efficient projects.
10. Support in implementation of research and development activities aimed at developing energy saving and energy efficient technologies.

In annex 2 some examples of energy saving projects in metallurgy are presented.

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2020</th>
<th>increase/decrease 2020 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel production, mln. t</td>
<td>72.4</td>
<td>69</td>
<td>59</td>
<td>90</td>
<td>24</td>
</tr>
<tr>
<td>Flat steel production, mln. t</td>
<td>25.4</td>
<td>23.1</td>
<td>21.9</td>
<td>38</td>
<td>49.6</td>
</tr>
<tr>
<td>Bar iron production, mln. t</td>
<td>33.6</td>
<td>32.9</td>
<td>28.3</td>
<td>37</td>
<td>10.1</td>
</tr>
<tr>
<td>Energy consumption per 1 ton of steel, kWh</td>
<td>779</td>
<td>775</td>
<td>755</td>
<td>715</td>
<td>-8.0</td>
</tr>
<tr>
<td>Energy density of 1 ton of steel (fuel and energy), tons of oil</td>
<td>1,075</td>
<td>1,068</td>
<td>1,073</td>
<td>0,908</td>
<td>-15.5</td>
</tr>
</tbody>
</table>

Table 1

Figure 5: Currently, energy use per unit of GDP in Russia is around 3 times higher than in OECD countries (2002) [6]
3 ENERGY EFFICIENCY POLICY AND LEGISLATION IN THE RUSSIAN FEDERATION

[Sources 3,4]

3.1 Introduction

Today energy efficiency improvement activities in Russia are focussing on the following:
- creating an energy efficiency legal framework;
- implementing specific pilot projects;
- supporting the events held with the relevant information.

The Russian Ministry of Economic Development is the federal executive body that performs the functions of developing a state policy and normative legal regulation in the field of energy efficiency in the Russian Federation.

Other relevant ministries and government agencies are:
- Ministry of Energy
- Ministry of Industry and Trade
- Ministry of Transport
- Ministry of Health and Social Development
- Ministry of Agriculture
- Rosstat, Rosstandart, etc.

Fundamental energy efficiency documents in the Russian Federation are:
1. List of tasks given by the President of the Russian Federation based on the results of the extended meeting of the presidium of the State Council of the Russian Federation dated 15 July 2009 No. ПР-1802ГС;
4. Plan made by the Ministry of Industry and Trade of the Russian Federation to implement the Energy Saving and Energy Efficiency Improvement Plan as approved by Order dated 29 December 2009 No. 1211;
5. Decisions made by the Commission under the President of the Russian Federation for Modernisation and Technological Development of the Russian Economy established by Decree of the President of the Russian Federation dated 20 May 2009 No. 579, which includes V. Khristenko, Minister of Industry and Trade of the Russian Federation, in one of the five priority areas – Energy Efficiency.

3.2 List of tasks given by the president of the Russian Federation

On 15 July 2009 a list of tasks given by the President of the Russian Federation was approved. On this list the following tasks were defined for the Russian Government and government bodies and entities:
- to develop the relevant regulatory legal acts in the context of preparation of the draft federal law “On Energy Saving and Increasing Energy Efficiency”;
- to develop and approve a state energy efficiency improvement programme 2020 to be financed from the federal budget;
- to make a list of research and development activities in the field of energy efficiency improvement which may be referred to priority activities as per established procedure for the purpose of tax incentives;
- to develop measures aimed at developing the Russian market of energy efficient equipment and energy metering devices, as well as submit proposals for supporting their development and production in the Russian Federation;
- to develop a set of measures aimed at modernizing thermal energy capacities, particularly, by transforming them to the mode of cogeneration of thermal and electrical energy;
- to submit proposals for extending the utilization of small generating facilities and other capacities of small-scale power generation, based on the practice of their utilization and launching in the constituent entities of the Russian Federation;
to organize the development of the scientific basis, engineering solutions, and design and experimental documentation to start after the year 2015 constructing comfortable residential and minimum resource consuming groups of buildings with twice or more reduced consumption of primary energy resources.

- comprehensive programmes aimed at increasing energy efficiency of the regional economies and reducing energy expenses in the budget-funded sector;
- a set of measures aimed at reducing energy expenses incurred by small and medium businesses.

3.3 Energy efficiency law


This Law is a general law on Energy Efficiency which creates the general framework for energy efficiency in Russia. The main focus in the Law is on the government and budget-funded sector. The government should be the first to start an energy efficiency reform. No specific measures are included for industry, but it can be expected that these will be developed in the future.

The Law applies to all kinds of activities associated with the use of energy resources and its concepts are:

- Energy Efficiency (EE) = features that reflect the ratio of beneficial effects from the use of energy resources to the cost of energy produced in order to obtain this effect, regarding products, technological processes, entities and individual entrepreneurs.
- Energy Saving (ES) = implementation of organizational, legal, technological, economic and other measures in order to decrease the volume of energetic resources used and preserve the relevant productivity.

This law provides:

- a mandatory energy audit in budget-funded organizations, the first audit shall be performed within the coming three years;
- an opportunity to enter into energy service agreements;
- an obligation to reduce energy consumption in comparable conditions by at least 3% per annum within five years. The savings above this standard shall be kept by a budget-funded institution and may be used, without limitation, for the staff salaries.
- a new ideology of public procurements. The Law introduces the right to set minimum energy efficiency requirements upon procurement of any goods for government needs. The Russian Ministry of Industry and Trade shall make proposals for changing the existing and/or introducing new product energy efficiency requirements.
- requirements for household appliances and devices. The law introduces a requirement for producers and importers to label their products according to energy efficiency classification.
- changes in the tariff policy. One of the main incentives to increase energy efficiency of natural monopolies and public utility organizations is the use of long-term tariff regulation methods, first of all, return on invested capital method. Tariffs will be established for three years or more, simultaneously with companies’ obligations to ensure reliability and quality of the services provided.

The scope of the Law includes water supplied, transferred and consumed using centralized water supply systems.

Requirements for EE apply to circulation of certain categories of goods and buildings, structures, installations, rooms in apartment buildings at various stages (construction, reconstruction, capital repairs, operations of buildings, installations and structures).

The following principles apply to the Law:

- Efficient use of energy resources.
- Support and encourage ES and increase EE.
- Systematic and integrated character of ES and EE programs.
- Planning and integration of activities increasing ES and EE.
• Use of energy resources with account to resource, technological, ecological and social conditions.

The action plan of the Law consists of:
• Gradual phasing out of incandescent electric bulbs. Since 1 January 2011, it is prohibited to produce, import, sell 100 or more Watt incandescent bulbs. Since 1 January 2011, it is prohibited to purchase incandescent bulbs of any capacity used for lighting for government or municipal needs. An approximate deadline is specified for a potential prohibition of production, import and sale of 75 or more Watt incandescent bulbs - since 2013, and 25 or more Watt - since 2014.
• Introduction of EE classes for goods and apartment buildings. The law introduces a requirement for producers and importers to label their products according to energy efficiency classification:
  o since 2011 – principal household energy-consuming appliances;
  o since 2012 - computer and office equipment;
  o since 2013 and further on – other goods, by decision of the Government of the Russian Federation, and since the date specified by the Government of the Russian Federation.
• Introduction of energy accounting meters (“energy gauges”)
  o By 1 January 2011 – installation of water, natural gas, thermal energy, electrical energy meters in commercial and industrial buildings and constructions. Until 1 January 2011, all legal entities, government institutions shall be equipped with energy metering devices, and not later than a month after their installation, pay for the energy consumed based on the readings of the metering devices.
  o By 1 January 2012 – installation of collective and individual meters in dwelling houses and apartments. Until 1 January 2012, all owners of residential houses and flats in multi-flat buildings shall have metering devices both in the building as a whole, and in each flat (except for thermal energy), with the right to apply to an energy supply organization for energy metering device installation on the terms of 5-year payment by instalments.
• EE requirements for buildings, structures’ Project Design Documents (PDD).
• EE requirements for public procurements of goods, works, services.
• EE and ES requirements for federal, regional, municipal programs.
• State information system on ES and EE.

Conclusions on the Law
The Law is aimed to reduce consumption rather than the production of energy. The Law is a framework act, mechanisms proposed by other laws (Law on concession agreements, Draft Law on heat supply adopted in the first reading on the 11 November 2009) may be implemented for the production of energy reduction.
• Modernization of energy system at the expenses of companies
• Economic and tax incentives:
  o Small range will be introduced in future to the federal legislation/ by bylaws.
  o Personal incentives at community level
• Importance of regional and municipal programs, as communities will finance the majority of EE efforts (pilot programs in schools and hospitals).
• Importance of educational programs and informational policy as public awareness is of great significance.

Relevancy for industry:
Two major chapters concern the industry:
1. Circulation of goods
   • Definition of 7 EE classes (“A”–“G”) of goods by the Ministry of Industry and Trade (MIT) with the concurrence of the Ministry of Economic Development (MED), according to the Government’s Draft Decree.
   • Principal requirement for manufacturers/importers to identify the EE class for their production.
   • The EE class must be specified in the technical documentation attached to the product, on tags and labels.
   • The above rules concern (Draft Government Decree)
   • Domestic energy-consuming devices (TVs, refrigerators, cars, etc.) from 1 January 2011.
   • Computers, computer electronic devices and “organizational” hardware (fax machines, copiers etc.) from 1 January 2012.
   • Other goods (lifts used for the transportation of people, heating appliances) from 1 January 2012.
   • Definite characteristics, categories of goods and exceptions shall be determined by MIT with the concurrence of the MED.
2. Developers and builders
   • Commitment for a minimum 5 year period, from the date of commissioning, that buildings, structures, installations:
     • Comply with EE requirements
     • Are equipped with proper energy accounting meters
     • Through the selection and implementation of:
       • Best architectural solutions
       • Best functional and technological solutions
       • Best construction solutions
       • Best engineering and technical solutions

Infringement
1. Non-commissioning of buildings, structures, installations constructed, reconstructed, or after major repairs that:
   • do not meet the EE requirements.
   • are not equipped with energy accounting meters
2. In cases of non-compliance of the builder/developer with its obligations in terms of energy accounting meters/ EE requirements, during design, construction, reconstruction capital repairs, the owner can claim:
   • free rectification within a reasonable period of time, or
   • reimbursement of costs incurred in rectifying these infringements.
3. Violation of legislation on EE conservation and improving EE leads to
   • disciplinary responsibility (observance, reprimand, dismissal).
   • civil responsibility (e.g. contractual responsibility, compensation of damages etc.).
   • administrative responsibility.

Administrative sanctions

<table>
<thead>
<tr>
<th>Type of violation</th>
<th>Executives</th>
<th>Individual entrepreneurs</th>
<th>Legal entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to comply with obligatory requirements on marking goods with their EE class</td>
<td>Penalty: RUB 10,000 – 15,000</td>
<td>Penalty: RUB 20,000 – 35,000 (with confiscation of goods)</td>
<td>Penalty: RUB 100,000 – 150,000 (with confiscation of goods)</td>
</tr>
<tr>
<td>Failure to comply with EE requirements in designing/construction/reconstruction/ capital repairs</td>
<td>Penalty: RUB 20,000 – 30,000</td>
<td>Penalty: RUB 40,000 – 50,000</td>
<td>Penalty: RUB 500,000 – 600,000</td>
</tr>
<tr>
<td>Failure to comply with gauge fitting requirements for residential buildings</td>
<td>Penalty: RUB 5,000 – 10,000</td>
<td>Penalty: RUB 10,000 – 15,000</td>
<td>Penalty: RUB 20,000 – 30,000</td>
</tr>
<tr>
<td>Failure to comply with EE requirements set for non-residential buildings</td>
<td>Penalty: RUB 10,000 – 15,000</td>
<td>Penalty: RUB 20,000 – 35,000</td>
<td>Penalty: RUB 100,000 – 150,000</td>
</tr>
</tbody>
</table>

Table 2

3.4 The role of the Ministry of Industry and Trade (MIT)

Within MIT the main implementing bodies are:
• System Analysis and Strategic Planning Department (focal point);
• Sectorial departments (Basic Industries Department, Chemical and Technological Complex and Bio-Engineering Technologies Department, and other departments concerned);
• Functional departments (Domestic Trade Regulation Department, Department of Public Policy in the Field of Technical Regulation and Ensuring Uniform Measurement, and others);
• Rosstandart.
The department of Basic Industries developed in 2010 the following rules:
• The rules to be used by producers and importers to identify an energy efficiency class of a
  product and other information about its energy efficiency;
• The rules for including the information about an energy efficiency class of a product in the
  technical documentation enclosed with a product, its labelling, and putting this information on
  its label;
• List of products categories (based on their characteristics) which should contain the information
  about their energy efficiency classes in the technical documentation enclosed with these
  products, labelling, and on the labels;
• List of exceptions from the categories of products, as well as characteristics of the products
  which should not contain the information about their energy efficiency classes in the technical
  documentation enclosed with these products, labelling, or on the labels.

The department will in 2011 develop the following:
• Analysis of widely used energy devices market to identify the least energy efficient energy
  devices. Monitoring and forecasting availability of similarly used products with high energy
  efficiency in the quantity that meets consumer demand;
• Making proposals for limitation (prohibition) of sales of inefficient energy devices;
• Making a list of fixed assets which refer to the facilities with high energy efficiency that are not
  classified according to energy efficiency, in which case tax payers may apply a specific
  coefficient to the basic depreciation rate, but no more than 2.
4 ENERGY AUDITING

4.1 Introduction

For energy auditing the following documents are relevant:
3. Order N 141, 04-07-2006: “approval of Recommendations for energy inspections (energy audit)”, the order describes the norms and rules for energy audit, classification of energy audit etc.

4.2 Energy audits

The Law allows energy audits to be undertaken with respect to products, buildings, structures, and technological processes, as well as legal entities and individual entrepreneurs, with a view to ascertaining amounts of energy resources used, and gauging energy efficiency and the potential for energy savings and energy efficiency increases, as well as planning and estimating supportive measures.

Only members of self-regulatory organizations may carry out energy audits. The Law envisages certain requirements to be met by such organizations. In annex # a list of consultants active in energy auditing is presented. [3]

As a general rule, energy audits are voluntary. But the Law also lists organizations subject to mandatory inspections of this kind, including, inter alia, the following:

a) organizations that produce, generate, and/or transport water, natural gas, heat, or electric power, produce natural gas, oil, or coal, manufacture oil products, process natural gas, refine crude oil, or transport petroleum and oil products;

b) organizations whose total expenses on consumption of natural gas, diesel and other fuel, residual fuel, heat, coal, and electric power exceed RUR 10 million per calendar year; and

c) organizations engaged in "regulated activities".

d) persons subject to mandatory energy auditing are to have the first such audit to be arranged and conducted by December 31, 2012, with subsequent audits to take place at least once every five years. [3]

The objectives of the energy audits are to eliminate inefficient consumption of energy resources. The energy audits are to be revised at least each 5 years to correspond with the actual situation. The energy audits are to be conducted by Self-Regulatory Organizations in order to collect objective data, on energy used, EE indicators, potential for ES and increase in EE (delivery of Energy Performance Certificates).

Energy audit are compulsory every 5 years from 1 January 2012 for stated regulated companies, companies operating in production or transport of energy (water, oil, gas, etc.) or investing in ES/EE and financed by Federal/Regional budgets, companies with yearly energy consumption higher than RUB 10 million (delivery of Energy passports).

Until recently, mostly only donor financed companies and projects executed energy audits (EBRD, IFC, EC/Tacis and Phare, Dutch Government). A – very welcome – positive turn-around from the disinterest of local companies is currently apparent and the larger Russian industries are starting to hire (local) energy auditors at own expense. [3]

Common industrial audits take place via walk-through inspections on:
• motors, fans, pumps and compressors
• lighting systems
• energy saving for large industrial processes (melting, drying)
• other electricity saving measures (compressed air systems, power distribution systems, cooling systems and peak power control
• heat and steam consumers
• heating, ventilation and air
conditioning systems
regulation heating systems [3]

Used measuring devices in Russia are amongst others:
infrared cameras
combustion analyzers
electricity quality gauges
temperature and humidity gauges
ultrasonic acoustic detectors
pH gauges
ultrasonic water flow gauges. [3]

In addition to the site visits, calculations of emissions GHG for the preparation of CDM investment projects are made as well as economic assessments and calculation tools. [3]

4.3 Energy passports

The findings of an energy audit are to be recorded in an "energy passport". Self-regulatory organizations are to send copies of mandatory audit energy passports to the duly authorized state authority. Subject to Russian commercial secrecy legislation, the latter may request from the self-regulatory organizations energy passports executed upon the results of voluntary energy audits. The data contained in the passports is subject to systematization, analysis, and use by the duly authorized state authority. [3]

4.4 EPS

Energy saving and energy efficiency improvement are not only technical issues. Behaviour of users as well as organisational issues has at least the same importance.

The Energy Potential Scan (EPS) has been developed within the framework of the Long Term Agreements (LTA) in The Netherlands and is characterised by a participatory approach. In the EPS first the existing energy situation of an industrial company is analysed and secondly options to improve energy efficiency, by brainstorming methods, are identified and reported in an Energy Efficiency Plan.

Usually the "Expert" model is applied to identify options to improve energy efficiency. This means that a consultant (expert) identifies options, without substantial cooperation of the company. In the expert model all available knowledge of the employees is not used.
In the EPS however the so called 'participative' approach has been chosen. Generates of opportunities for energy efficiency improvement is done in close cooperation with employees and with commitment of management. This participative process guarantees a high level of involvement, motivation and acceptance, so that implementation of energy efficiency measures can be completed more successfully.

The EPS methodology has successfully been applied in a couple of hundred companies in the Netherlands. When starting up the LTAs the EPS methodology was applied to identify the energy efficiency potential of an industrial sector and derive from that an ambitious but realistic energy efficiency target for the whole sector in LTA. The EPS also served as the base for establishing an Energy Efficiency Plan (EEP) on company level, being a plan that describes what activities the company will taken within the next 4 years to improve energy efficiency.

The long term energy objective for industrial companies is a working energy management system. In figure 6 is an energy management system visualised by the Deming circle: a continuous improvement in time of the energy efficiency (performance indicator) by making an Energy Saving Plan (Plan), carrying out the measures (Do), monitoring the effectiveness (Check) and review (Act). But it is not easy to implement and start-up such a system and to let it work as "business as usual". The EPS is a proven methodology to start up this process. [16]
The figure shows the place of the EPS in the process of energy saving in the industry. The EPS can be seen as the first action in the whole process of energy saving. The basic idea is that a company works together with an energy consultant. This consultant is trained to work participative; this means together with people from the company. During this six months lasting EPS process the company can start in a structural way with energy saving and the company will be prepared for implementing an Energy Management system. [16]

To start with energy saving by carrying out an EPS means building a Deming circle and creating a balance in the following eight issues:
1. **Awareness** about the necessity of energy saving. This delivers the drive and motivation for the company.
2. **Commitment**, the management should agree with the EPS, the participation of employees and an open attitude to deliver data.
3. **Analysis** on a structural way and together with the company analyse the energy situation it gives insight and supports awareness.
4. **Saving potential** brainstorm sessions, together with the energy responsible about saving possibilities. What can be saved? Is it substantially?
5. Find a **Performance indicator** to show the effectiveness of the measures which are or will be carried out.
6. Write a **Saving plan** which is a concrete plan with measures and acceptance to carry out in the next few years.
7. An **Investment plan** is part of the saving plan; there should be a financial plan for carrying out the energy saving measures.
8. **Continuity** What to do after the EPS? How to go on? What kind of actions should be taken for continuity; for implementing an Energy Management system? [16]

A balance in these eight items is important. A very detailed overview of all energy saving options without an investment plan is not realistic. Taking measures without an idea how to visualize the effect is not stimulating the process. In practice you need all eight issues for the first steps in energy saving. [16]
In Russia a pilot project on EPS was carried out at Proletarsky zavod in St. Petersburg. Tebodin Eastern Europe from Russia and Energy Experts International (EEI) from The Netherlands were involved in this pilot project together with a team of experts from Proletarsky zavod. The pilot project was carried out during the period of October 2010 to April 2011. Proletarsky zavod, together with Tebodin and EEI, have been investigating the energy consumption situation on their facility. The result is an Energy Saving Plan for 3 years with the potential to save up to 20% of energy resources. Required investment is 92 million rubles with an estimated payback time of 3.1 years. Since employees of Proletarsky zavod, the Energy Action Team (EAT), were actively involved in preparation of the plan they fully understand and accept the concepts stipulated in it. Full understanding of the stipulated measures ensures efficiency of its implementation and commitment to the process.

4.5 Conclusions from the pilot project

Results
The EPS training and EPS pilot are successful because of two important elements:
1. the quality of the local consultant with knowledge of the facility installations;
2. the commitment of the management from Proletarsky zavod with a focus on a list with concrete feasible measures. [7]

The results of the EPS at “Proletarsky zavod” show great saving potential and the ideas, since they were developed together with the plant, have full support from management. [16]
The EPS pilot result is an energy saving plan with a saving possibility of 20% with an estimated payback time of 3.1 years is very good. [7] “Proletarsky zavod” confirmed the original assumption that the EPS method is a relative simple but very effective method to create insight and understanding of the potential energy saving possibilities. [16]
A follow-up project to implement some of the items and monitor result may support the effectiveness of the method. The next question will be of course financing and the next logical step would be a more in-depth financial investment plan. [16]

Practical use
This success can be continued if the EPS elements can be transformed and fit into the legislation: "energy passport". One of the advantages for the company is lowering external costs, because of the possibility to carry out a lot of work internally. (Independent work is one of the characteristics of an EPS). The EPS methodology is in custom shape applicable for the Russian Industry (use formats and be very concrete.) [7]

Ideally we would recommend allowing companies to acquire the energy passport by the EPS procedure. As an alternative it would be good to recommend the EPS as a “first big step” towards the real energy passport. Since much of the work gets done by the actual company, the costs are lower and the understanding of the result is higher. Somehow a way should be sought where the resulting report of the EPS, possibly with some additional information or measuring, may be used for further obtaining of the energy passport. Possibly setup of EPS can be brought closer to Energy Passport forms. [16]

In order for EPS to be not considered as "additional" to the other Russian requirements related to Energy saving, such as energy passport, EPS shall be expanded so it is more directly useable for official documents. [5]

Cost
Since the investigating work for this scan has been done for more than 60% by efforts of the employees from Proletarsky zavod this method for similar enterprises results in lower costs. [5]

Added value of EPS
The main benefit and aim of the EPS is the creation of awareness and commitment of the factory management to ensure that all the findings and suggestions are supported and understood correctly and prevent that after the energy audit the results will be left without actions. The initiation of the so-called Energy Action Team and dedication of the management is in our opinion an important item. [5]
Rather than having a third party energy efficiency report, the result is a plan prepared, discussed and agreed upon with a dedicated plant team. The chances of recommendations for future being followed and incorporated are therefore considerably higher. And this is in the end the target! [5] Energy management should be emphasized for continuity in energy saving on the longer term. This should be the next step in conjunction with monitoring. [7]

4.6 Possible integration of Russian regulations into EPS method

The method and result of the EPS is considerably different from the approach as currently followed by companies in Russian working on the preparation of the Energy Passports. The latter projects are mainly focused on the obtaining of the certificate rather than the actual improvement of the energy consumption. [5]

Tebodin made a comparison of the data obtained as a result of EPS and the requirements for the energy passport. The conclusion of this comparison is that approximately 50% of the most important data required to be specified in the energy passport is present in the EPS report. The following key items are excluded:

- Information on production and power consumption for the last 5 years. Our scan analyzes the last calendar year prior to the Scan and the year preceding to it.
- Information on liquid fuel consumption. The liquid fuel was back-up fuel at this Plant, was not actively used, its quantity is not significant compared to the other types of energy resources.
- Information on consumption of engine oil: gasoline, kerosene oil, diesel oil, gas.
- Energy resource forecast for subsequent years.
- The quantity of overhead lighting fixtures per each building. The total capacity without detailing was analyzed.
- Detailed description of overhead energy lines.

In order to become more easily and attractive to be accepted in Russia as an official method, we recommend integrating parts of active and upcoming regulations as a fixed part of the EPS method, so that the results are both the required documents needed by Russian regulations as well as a realistic and supported plan by the plant management. [5]

Specifically we recommend using EPS approach when conducting “energy express-audit”. The latter term has been suggested by Russian ministry for industry and energy (Order N 141, on the “Approval of Recommendations for energy audit”).

“Express audit” methodology has not been described in any details so far. We suggest that EPS may become a starting basis for elaboration of more detailed official regulations instructing on “Express audit” method implementation. [5]

EPS method can be recommended as a good basis for the “energy express-audit”, assigning it the status of the official method. [16]
5 INSTRUMENTS TO STIMULATE ENERGY EFFICIENCY

5.1 Instruments used in the Netherlands to stimulate energy efficiency

In the Netherlands there is 20 years of experience with energy efficiency in industry. From this experience we learned that a leading role of the Government is the most important requirement for a successful implementation of energy efficiency in industry. The Government is responsible for the implementation of policies and measures and the initiation of an energy efficiency market.

NL Agency, as implementing agency on behalf of the Government, played a role as independent organisation in charge of the implementation of the energy efficiency policy. NL Agency also facilitated the dialogue between Government and industry.

From the early 90’s until now several successful instruments were used in the Netherlands to improve energy efficiency in industry. These instruments can be divided in four groups:

1. Legislative instruments
2. Economic instruments
3. Structural instruments
4. Information dissemination instruments

5.1.1 Legislative instruments

Environmental Management Act

The Dutch energy policy is anchored in the environmental law (Environmental Management Act). This law, which applies for the whole industrial sector contains some generic energy aspects as duty to care for energy. According to this law, companies are obliged to carry out energy saving measures with a simple pay out time less than 5 years. Besides, all companies with an energy consumption more than 25,000 m³ natural gas and/or 50,000 kWh electricity can be obliged to perform an energy audit. However this is up to the local authorities, who visit the companies on a regularly basis.

Additional instruments are developed to make energy more specific and to avoid difficulties with control and supervision of this law. These instruments, Long Term Agreements for instance, do not replace the law. Depending on the energy consumption and total energy costs of a company, there are additional judicial instruments, as mentioned in the table below.

<table>
<thead>
<tr>
<th>Company with a yearly energy consumption of energy costs of:</th>
<th>Judicial instrument</th>
<th>Additional judicial instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. &lt; 25,000 m³ natural gas and &lt; 50,000 kWh</td>
<td>Environmental law</td>
<td>No obligations on energy</td>
</tr>
<tr>
<td>2. &lt; 75,000 m³ natural gas and &lt; 125,000 kWh</td>
<td>Environmental law</td>
<td>A branch specific measure list must be filled in; measures must be carried out.</td>
</tr>
<tr>
<td>3. Energy costs &lt; € 100,000.</td>
<td>Environmental law</td>
<td>Energy audit can be obliged by the local authority. Limited support of Energy Centre</td>
</tr>
<tr>
<td>4. Energy costs &gt; € 100,000.; energy consumption &lt; 0.5 PJ</td>
<td>Environmental law</td>
<td>Covenants: Long Term Agreements (LTA1, LTA2, LTA3)</td>
</tr>
<tr>
<td>5. Energy consumption &gt;0.5 PJ</td>
<td>Environmental law and EU-ETS</td>
<td>Covenants: benchmarking and MEE (almost similar to LTA; CO₂ is leading)</td>
</tr>
</tbody>
</table>

Table 3: Overview of the additional judicial instruments in dependency of the yearly energy consumption or energy costs from a company [15]
The European Union Emissions Trading Scheme (EU ETS) is the largest multi-national emissions trading scheme in the world. It was launched in 2005 and is a major pillar of EU climate policy. The EU ETS currently covers more than 10,000 installations with a net heat excess of 20 MW in the energy and industrial sectors which are collectively responsible for close to half of the EU’s emissions of CO2 and 40% of its total greenhouse gas emissions.

Under the EU ETS, large emitters of carbon dioxide within the EU must monitor and annually report their CO2 emissions, and they are obliged every year to return an amount of emission allowances to the government that is equivalent to their CO2 emissions in that year. Emission credits are given out for several years; Trading Period. The 1st EU ETS Trading Period expired in December 2007. Since January 2008, the 2nd Trading Period is under way which will last until December 2012. Currently, the installations get the trading credits from the NAPS (National Allocation Plans) which is part of each country’s responsibility. Besides receiving this initial allocation, an operator may purchase EU and international trading credits. If an installation has performed well at reducing its carbon emissions then the company has the opportunity to sell its credits and make a profit. This allows the system to be more self contained and be part of the stock exchange without much government intervention.

The proposed caps for the 3rd Trading Period foresee an overall reduction of greenhouse gases for the sector of 21% in 2020 compared to 2005 emissions. [15]

Long Term Agreements: voluntary but not without obligation

The main instruments to stimulate energy efficiency in industry, not covered by the EU-ETS, are the Long Term Agreements and the Benchmarking Covenants. (In 2010 the Benchmark Covenants changes in the MEE covenant; almost similar to LTA). The LTAs are voluntary agreements between government (national and local) and the industrial sectors about the more effective and efficient use of energy. Companies voluntarily work together with the government and with each other. In the Netherlands almost a thousand companies from 25 sectors are participating in the LTAs. Voluntary, but not without obligation. That is the central idea of LTA. A combination of freedom and result orientation. The government at a greater distance and the business community is at the wheel. This does not mean that the government takes no responsibility. Quite the opposite, in fact. Various Ministries think along actively with LTA and regularly meet with sectors and companies. They come up with ideas for solutions, possibilities for subsidies and other support. But it is the companies and branch organizations themselves that are set to work with concrete measures.

The government parties are the national government, the provinces and the municipalities. Four Ministries are involved in the LTAs on behalf of the national government. They have appointed NL Agency as independent expert agency to facilitate and monitor the progress. NL Agency monitors the results of the LTA every year by using an internet application, to be filled in by the participating companies. The results are aggregated to the branch level and are public. NL Agency helps companies with such matters as drawing up an energy efficiency plan, introducing energy management and organizing business days. NL Agency advises the department about policy pre-conditions so that the LTA participants know were they stand and are not bogged down with red tape. As license-granting authorities under the Environmental Management Act, the provinces and municipalities are closely involved in approving the energy efficiency plans drawn up by the companies.

LTA is constantly evolving. There are three LTAs; Every LTA has its own obligations:

- **LTA1 1989 - 2000:** during this period companies made systematic efforts to improve energy efficiency. The efforts in that period led to the desired improvements in energy efficiency from 2% per year. Focus was on process efficiency, with other words energy efficiency improvement inside the companies.

- **LTA2 2000 - 2008:** this LTA is a sequel to the success of the LTA1. Companies can contribute to improvement of the energy efficiency in their branch by:
  - Taking certain cost-effective measures to improve the energy efficiency within their organization(s);
  - Systematic energy management at the company;
  - Taking measures in the field of life cycle efficiency (renewable energy, product design and functionality, logistic themes and energy efficiency in the product chain.

- **LTA3 2008 - 2020:** this LTA is like LTA2 but is extended with an obligation to effort for a 2% energy efficiency improvement per year and to carry out sector roadmaps with the goal how to increase energy efficiency with 50% in 2030.
When a company or sector does not achieve the targets within the LTA, (when the company
doesn’t make an energy efficiency plan or doesn’t take part in the yearly monitoring or refuses to
implement energy management) it falls under the Environmental Law where penalties can be
levied. 18.5% of the total Dutch energy consumption is covered by the LTAs. [15]

Benchmark covenant
In the year 1998, the energy intensive industry proposed to replace the LTA approach by a
different type of agreement, still resembling much of the features of and experience from the LTAs.
This new approach is called “International Benchmarking”. The basic idea is that the energy
intensive industry in the Netherlands cannot be pushed further than to become (and stay) among
the “Best in the World” (in terms of energy efficiency). Exactly this situation (being the best in the
world) is made the target of so called Benchmark Covenant.
On July 6, 1999 these were signed by:
The Ministers of Economic Affairs, and Housing, Spatial Planning and Environment;
Representatives of the provinces;
The employers’ organization VNO-NCW;
Six industrial sectors (chemicals, iron and steel, non-ferrous, oil refineries, paper and board and
power generation)
The Benchmark covenant does not exist anymore. It is replaced by the EU-ETS for the CO2 –
emission on EU-level and for the energy regulations there is the MEE covenant. [15]

5.1.2 Economic instruments

EIA (the Energy Investment Allowance introduced in 1997), this is a possibility to deduct a certain
percentage of investments in energy saving measures from the companies’ profit. This means a
lower income tax, so a financial benefit for the investor. The EIA is a fiscal instrument

VAMIL (free deduction of environmental investments), is the possibility to allow the investor in
ergy saving measures to deduct the investment-amount from income or profit. Depending on the
profits of a company, the year in which to subtract the investment can make a difference on the
income taxes to be paid. The VAMIL is a fiscal instrument.

EINP (Energy Investments in the Non Profit branches), is a subsidy for investments in energy
efficient technologies or renewable energy that can be used by non-profit organizations instead of
the EIA. EINP is no longer available.

Subsidies Furthermore, different subsidies both on investments, research, development and
demonstration projects are available, mainly from the Ministry of Economic Affairs and executed by
NL Agency. Note that most subsidy schemes and accompanying measures are available for all
Dutch firms, so not only for the ones that signed an LTA. This is to avoid distortion of the market.
There local incentives (grants or loans) by Provinces and Municipalities possible, to stimulate the
development of certain techniques or companies.
The possibilities for subsidies are restricted by European regulations. The framework of state
support prohibits the support of the own companies detriment of the European competitors.

Energy tax (REB) The scheme below gives an overview of the energy tax. Especially the small
energy users pay relatively the most tax. This is because many of the big industrial companies are
operating in International markets and a unilateral increase of the energy prices in the Netherlands
can mean a big reclining in competitiveness. It will decrease the investment potential for the
companies involved and can risk the continuation of the activities. [15]

5.1.3 Structural instruments

Most of the hereafter mentioned instruments are developed within the LTA program and also in use
by the participating companies.
• Helpdesk and website for energy and environmental related measures.
• Yearly monitoring of the energy efficiency with an internet application. This, especially mend
  for the LTA participants, is to monitor the LTA effect. The results are public on sector level.
• Program and tools for implementing energy management. There is an internet application, a
  forum and external consultant to coach companies with implementing energy management.
- Calculation tools as isolation scan, steam scan, lighting scan. The user can optimize his system with these tools. The tools are for free available.
- Information and documentation about best practices; numbers, figures and data about energy.
- Guidelines for energy audits and Energy Potential Scan.
- Measure lists in an Excel spreadsheet with more than 500 generic and sector specific measures. Updated on regularly basis with measures from also the energy efficiency plans. These measure lists can be used for the efficiency plan to generate new ideas.
- Calculation formats for pay back calculations of energy saving measures.
- Companies under an LTA are offered a free energy audit once the agreement is signed to investigate opportunities for energy efficiency improvement. Sometimes it is possible to get the EPS consultant (Energy Potential Scan) financed by the government. This is a service provided by the government budget. [15]

5.1.4 Information dissemination instruments

There are several communication instruments as websites, leaflets, Best Practices, publications, all kinds of newsletters, symposia, workshops, networks and platforms on specific themes and technologies, events through which information about energy efficiency and its possibilities are spread.

Also training of experts in energy optimisation and energy management in useful to disseminate knowledge about energy efficiency. [15]

5.1.5 Requirements for policy framework:

Based on the experiences in the Netherlands the following basic requirements are essential:

- Leading role Government → Implementation of policies and measures and initiation energy efficiency market
- State Agency responsible for Energy Efficiency Policy Implementation
- Adoption of foreign expertise and adoption of foreign best practise
- Interaction (scheme) and dialogue between (local) government and industry on energy efficiency policies
- Long term approach (VA programme) → Clear targets, government support, government pressure (directive), systematic approach (EnMS))
- Communication and sharing of information is crucial → projects, demo’s, availability and accessibility
- Good monitoring is crucial (stimulation)

5.2 Incentives for stimulating energy efficiency in Russian industry

The Law stipulates that the Russian authorities develop incentives. To the best of our knowledge, there is no specific and factual information available on these incentives yet. [3]

Another key element is demand side management. Its main idea is the creation of economic consumer incentives to reduce energy consumption, particularly at the moments of peak load, thus lowering the need for generating capacities. The most common ways to achieve these goals include installing meters and introducing differentiated tariffs with variable rates for periods of peak and low loads, as well as using interruptible energy supply contracts, which make it possible to lower the load or disconnect consumers during peak hours. [3]

Apart from this, administrative measures, such as regulations for equipment efficiency and building codes, are needed to restrain wasteful consumption. According to estimates by the Ministry of Industry and Energy, the development and introduction of prospective regulations, standards and procedures in the near future will make it possible to reduce hydrocarbon production losses by 15 percent, while new control and accounting systems will assist energy resource consumption by 10-15 percent. [3]
5.2.1 Financial incentives available for energy efficiency in industry

Currently, the Russian government is elaborating a range of financial incentives (including taxes) to encourage energy saving. This effort is taking into account both international experience and the results of such activities in Russia at the regional level. [3]

Higher energy prices are another incentive for energy savings. In this regard, the decision of the Russian government to increase domestic gas prices is important. The government plans to increase the gas price up to the level where sales to domestic and foreign markets are equally profitable, using long-term five-year contracts with electric power organizations, and resolutions ordering the increase of the electricity share which should be sold at non-regulated prices. The gradual implementation of these measures should be completed by 2015. [3]

Besides government incentives there are also some international institutions that provide financial incentives for energy efficiency in industry. Examples are the IFC’s Cleaner Production Program (www.ifc.org/ifcext/eca.nsf/Content/Russia_Cleaner_Production_Program_russian). IFC in cooperation with local banks introduces financing for energy efficiency projects. Also EBRD is currently setting up a special direct loan facility to larger Russian companies. EBRD’s RUEFF is facilitating local bank financing for Russian SME’s (www.ruseff.ru). Bilateral grants/projects of primarily the Scandinavian countries, Germany and last but not least the Netherlands. [3]

5.2.2 Energy efficiency in educational programs

To make energy efficiency generally accepted it is important to include this topic in education programs. In Russia is energy efficiency, as far as we know, not included in the national educational program yet. There are some local initiatives that can be mentioned, including:

- The Moscow City Government has an educational program including theatre plays in schools about energy efficiency and programs to train children in schools to be energy champions that make sure the lights are turned off when leaving the classroom, etc.
- The portal http://www.energosber.info/articles/all-study/ includes information on energy efficiency for children:
  - Video lessons.
  - Books and magazines on energy-efficiency.
  - Educational materials for children.
  - Posters.
- Another energy efficiency portal with educational information: http://portal-energo.ru. [3]

5.2.3 Communication between Russian government and Russian industry

The Russian government has put energy efficiency more firmly on the political agenda since the adoption of the new law on energy efficiency in 2009. Energy efficiency is a topic of many meetings and conferences, but usually more in a general sense than specifically aimed at the industrial sector. [3]

Communication between the government and industry is arranged through:

- Publications and Statements of government officials.
- Round tables/ conferences/seminars in the network of Chamber of Commerce and Industry, Russian Union of Industrials and Entrepreneurs and other business communities.

The government has a Unified State Information System on Energy Efficiency (http://portal-energo.ru/blog/details/id/67). This portal holds information on the opportunities, technology, legal aspects and practical experience on energy efficiency in Russia and abroad. [3]

Furthermore, energy efficiency has been a recurring topic at meetings of the Presidential Committee for the Modernization of the Economy. Recently, the topic was discussed at a meeting of the Committee in Khanty-Mansiysk (see: http://www.rusecounion.ru/ang_enef_22310). [3]
6 BARRIERS AND CHANCES

6.1 Barriers

In Russia there are still a lot of barriers which prevent energy efficiency in industry. Many of these barriers are a structural, political or administrative barriers. There is room for improvement of the regulatory bases. Also lack of government funding is a big problem, there are no subsidies nor are there tax incentives. Lack of public awareness is another major issue. People still forget: A Ruble saved is a Ruble earned. And there is no common interest between producer and consumer in energy efficiency.

In the IFC document “Energy Efficiency in Russia. Untapped Reserves” [1] the following barriers in Russian industry are identified:

- A lack of awareness among managers.
- No incentives for managers to adopt energy efficiency measures.
- Companies, especially SMEs, often lack the capacity to carry out sufficient, in-depth analysis to determine how they can cut energy costs.
- Banks cannot offer attractive financing terms for industrial modernization projects because banks themselves have limited access to medium and long term funding.
- Banks fail to understand energy efficiency investments.
- Companies lack incentive to save because energy tariffs are growing slower than product prices.
- Electricity and gas supply contracts require that total contract payments are based on forecasted demand rather than actual consumption. [1]

One of the most persistent barriers to implementing energy efficiency projects, including performance contracting, is the lack of energy monitoring systems, particularly convincing ways to establish baselines. For example, after energy efficiency equipment is installed in a hospital, few if any facilities have the ability to determine whether reduced energy costs are the result of mild weather, lower occupancy or changes in behaviour. Without a convincing baseline or determination of the savings generated solely by new technologies, a city cannot assess the payback of energy efficiency projects and cannot enter into performance contracting arrangements. [3]

6.2 Chances

Benefits of promoting energy efficiency in the Russian Federation are that energy efficiency mitigates the risks and costs of Russia’s high energy intensity, and will allow Russia to:

- Maintain competitiveness: As rising tariffs diminish the world’s largest energy subsidy ($40 billion in 2005), profits of industrial enterprises will decrease by at least 15 percent. Energy efficiency will allow companies to maintain competitiveness;
- Increase oil and gas export earnings: Russia’s energy intensity has a cost of $84-112 billion per year in terms of foregone export revenues;
- Lower budget expenditures: $3-5 billion can be saved annually from federal and local budgets by eliminating the inefficient use of energy;
- Reduce environmental costs: By ignoring the consequences of emissions caused by its energy intensity, Russia sacrifices the health and welfare of its citizens and roughly $10 billion per year in direct economic benefit from selling CO2 emissions reduction units. [1]

If its energy efficiency potential was to be fully realized, Russian CO2 emissions in 2030 would be approximately 20 percent below the 1990 level. Russia’s energy efficiency potential translates into a CO2 emissions reduction of 793 million tons of CO2 equivalent per year (about half of 2005 emissions). Not only will this contribute to addressing the challenge of climate change, but it will significantly improve Russia’s international image and help Russia to remerge as a leader in addressing global environmental issues. [1]

Implementation options for Russian government with regard to energy efficiency in industry are according to In the IFC document “Energy Efficiency in Russia. Untapped Reserves” [1]:

- energy efficiency information awareness campaigns;
- better dissemination of information on energy efficiency;
• stimulate these “no cost-low cost” measures;
• develop energy efficiency standards and labels for industrial equipment;
• facilitated financing energy efficiency through financial institutions;
• introduce fiscal incentives in the form of tax relief;
• tariff reform and liberalisation energy markets;
7 CONCLUSIONS AND RECOMMENDATIONS

During the implementation of the project many information came along. Also many experiences were gained. All this information is brought together in this document.

On 15th of June 2011 a round table expert meeting was held in Moscow. Experts from Ministries, knowledge institutions and consultancy firms were participating in this meeting. Presentations about the results of the project and the gained knowledge were given to the participants and discussed during the meeting.

In the closing session a set of final conclusions and recommendations were discussed. These conclusions and recommendations are mentioned below.

7.1 Conclusions

The following conclusions are based on the Dutch and Russian experiences with energy efficiency, the knowledge gained in this project as well as the discussions during the Round Table meeting held in Moscow.

- Suitable instruments for stimulating energy efficiency in Russian industry are dissemination of knowledge, experiences and best practises, energy management, capacity building, fiscal instruments, facilitation financing options, target setting.
- There is a need for coherent energy efficiency policy from the side of the government.
- The EPS pilot was a success at Proletarsky zavod.
- The EPS methodology is a good instrument and in an adapted form it is a suitable instrument to prepare an Energy Passport and an Energy Saving Plan.
- The EPS is a quick, efficient and cheap way for a company to get a good insight in its energy use and energy saving possibilities.
- The communication between government and industry can be improved.
- After an Energy Saving Plan is made there is no control whether energy saving measures are actually implemented.
- Implementation of energy saving measures is difficult because financing possibilities are not existing or not known.
- The UNIDO project is a very good opportunity to distribute knowledge and experiences and also gain more experience with methodologies like the ETS. [16]

7.2 Recommendations

For MIT and MINERGO

1. Financing possibilities should be identified, improved and the information about these financing possibilities should be communicated. (MINERGO, MIT and MINFIN together with REA and banks.)
2. Based on international experiences it is recommended to only formulate and implement legislation which can be maintained against acceptable costs. (MIT and MINERGO.)
3. The government should start a dialog with industrial associations about developing energy efficiency policies for industry in the future. Voluntary agreements should be discusses as one of the possible future policy instruments. (MIT and MINERGO.)
4. Examine how EPS can play a role when carrying out an energy audit for preparing an Energy Passport and an Energy Saving Plan and use the Tebodin case in St. Petersburg as a best practice. (MIT and MINERGO.)
5. SRO’s and certified energy auditors should be informed and trained in the EPS methodology using the Tebodin case in St. Petersburg as a best practice. (MIT and MINERGO)

For MIT

6. Spread the knowledge of the EPS pilot in St. Petersburg among the Russian industry. (MIT together with REA and with support from NL Agency).
7. Companies should be stimulated to carry out low cost/no cost energy efficiency measures. (MIT together with Union of Industrialists and Entrepreneurs.)
For MINERGO
8. The Ministry of Energy should coordinate dissemination of knowledge. (MINERGO.)
9. Make knowledge about energy efficiency (ao foreign best practices) accessible and provide it in the Russian language through an internet portal. (MINERGO together with REA.)
10. The Federal Energy Service Company, which is currently under construction and which will be responsible for carrying out energy audits in federal owned organizations and public buildings, should be encouraged to adapt the EPS approach and to exclusively use the EPS to conduct the aforementioned energy audits. (MINENERGO.)
11. The government should play an exemplary role by starting conducting energy audits en implementing energy saving measures in the governmental buildings and state owned companies. (MINENERGO.)

For UNIDO
12. UNIDO should consider using the EPS methodology in the framework of the GEF project. (UNIDO)
13. UNIDO should use the result and findings of this G2G project and propose to further elaborate on the project started at Proletarsky zavod. (UNIDO)
REFERENCES

ANNEX 1: CONSULTANTS ACTIVE IN ENERGY AUDITING

- (Partly) Publicly financed or supported auditors are the so-called Regional Energy Efficiency Centres of which the first five ones in North-West Russia were set up in co-operation with Norway in the 1990s. Kola Energy Efficiency Centre (www.keec.com) was established in 1996 and is certified as energy auditor by the State Energy Supervision.
- The Regional Center of Energy Saving Management, Tomsk has executed over 100 industrial audits since 1996 (www.es.tomsk.ru).
- Non-profit and non-governmental CENEf (with about 30 affiliates throughout Russia) for over 15 years provides a wide range of consulting services in the development of energy efficiency policies, housing reform, power sector reform, energy demand projections, and mitigation of climate change to the Russian government, local governments, municipalities, international organizations, foreign agencies, international and foreign financial institutions, industrial plants and commercial firms (www.cenef.ru).
- The JSC Novosibirsk Energy Centre continues the work of the EC Energy Centre Novosibirsk carried out the Tacis Programme aimed at the development and introduction of measures on saving of all types energy resources and environmental conservation (http://www.necenter.ru).
- Other examples of consultants involved in energy auditing are:
  - Center of energy saving technologies of Republic of Tatarstan: http://www.cetrt.ru.
  - Volgograd Center of energy efficiency: http://www.vce34.ru.
  - LLC Energoeffect (Tula): http://energyeffect.net.
  - Project Service (Chelyabinsk): http://www.project-service.ru.
- Finally, Western companies can provide for audits from their home offices like former Gasunie Engineering&Technology, incorporated in KEMA. These services are too expensive for Russian clients.)
ANNEX 2: EXAMPLES OF ENERGY SAVING PROJECTS IN METALLURGY
<table>
<thead>
<tr>
<th><strong>Project</strong></th>
<th><strong>Investments, RUB mln.</strong></th>
<th><strong>Energy saving</strong></th>
<th><strong>Cost reduction</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction of electric steel casting plant and continuous casting plant at «Seversky Pipe Plant» JSC ( «TMK» group)</td>
<td>7 900</td>
<td>5 times (0.257 to 0.049 tons of oil equivalents /t)</td>
<td>Cost reduction – 437 RUB/ton of steel</td>
</tr>
<tr>
<td>Construction of electric steel casting plant and continuous casting plant at «Pervouralsky New Pipe Plant» JSC ( «ЧТПЗ» group)</td>
<td>19 215</td>
<td>47% (0.3644 to 0.2299 tons of oil equivalents /t)</td>
<td>Cost reduction – 290 RUB/ton of steel</td>
</tr>
<tr>
<td>Coal injection in blast furnaces instead of natural gas at «Nizhnetagilsky Metallurgical Plant» JSC and «West Siberian Metallurgical Plant” JSC</td>
<td>7 440</td>
<td>4% (0.4928 to 0.4731 tons of oil equivalents /t)</td>
<td>Cost reduction – 169 RUB/ton of steel</td>
</tr>
<tr>
<td>Construction of hydrogen station No. 3 at &quot;Novolipetsky Metallurgical Plant&quot; JSC (reforming of natural gas instead of electrolysis)</td>
<td>599</td>
<td>23% (annual savings - 195 mln. kWh)</td>
<td>Cost reduction – approximately 30 RUB/ton of steel</td>
</tr>
<tr>
<td>Construction of turbine generator No. 8 at &quot;Novolipetsky Metallurgical Plant&quot; JSC (energy generation by means of excess vapour)</td>
<td>285</td>
<td>25% (annual savings - 136 mln. kWh)</td>
<td>Cost reduction – approximately 20 RUB/ton of steel</td>
</tr>
<tr>
<td>Construction of new heating furnaces No.4,5 «2000» at &quot;Novolipetsky Metallurgical Plant&quot; (reduction of natural gas consumption, increase of productivity)</td>
<td>2 400</td>
<td>30% (annual savings - 70 mln. m3 of natural gas)</td>
<td>Cost reduction – 130 RUB/ton of steel</td>
</tr>
<tr>
<td>Use of electrolytic furnace PA-300 at Khakassky Aluminum Factory (OK РУСАЛ)</td>
<td>750</td>
<td>9% (savings in 2008 – 398 mln. kWh)</td>
<td>Cost reduction – 640 RUB/ton of primary aluminum</td>
</tr>
<tr>
<td>Construction of ГБЖ-2 (direct reduced iron) at «Lebedinsky Mining and Processing Complex» ( «Metalloinvest» Holding)</td>
<td>22 000</td>
<td>30-40% energy reduction (compared to cast iron production)</td>
<td>Cost reduction – 210 RUB/ton of steel</td>
</tr>
</tbody>
</table>