

**United Nations Economic Commission for Europe  
Project “Financing Energy Efficiency Investments for  
Climate Change Mitigation”**

**National Case Study  
Russian Federation**

**Realization of Energy Efficiency Lighting Systems in  
Moscow, Moscow region and Nizhniy Novgorod region**

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**WORKSHOP ON CASE STUDIES ON OVERCOMING  
BARRIERS TO INVESTMENTS**

**INTO ENERGY EFFICIENCY AND RENEWABLE  
ENERGY PROJECTS THROUGH**

**POLICY REFORMS**

**10-11 November 2009**

**Kiev, Ukraine**

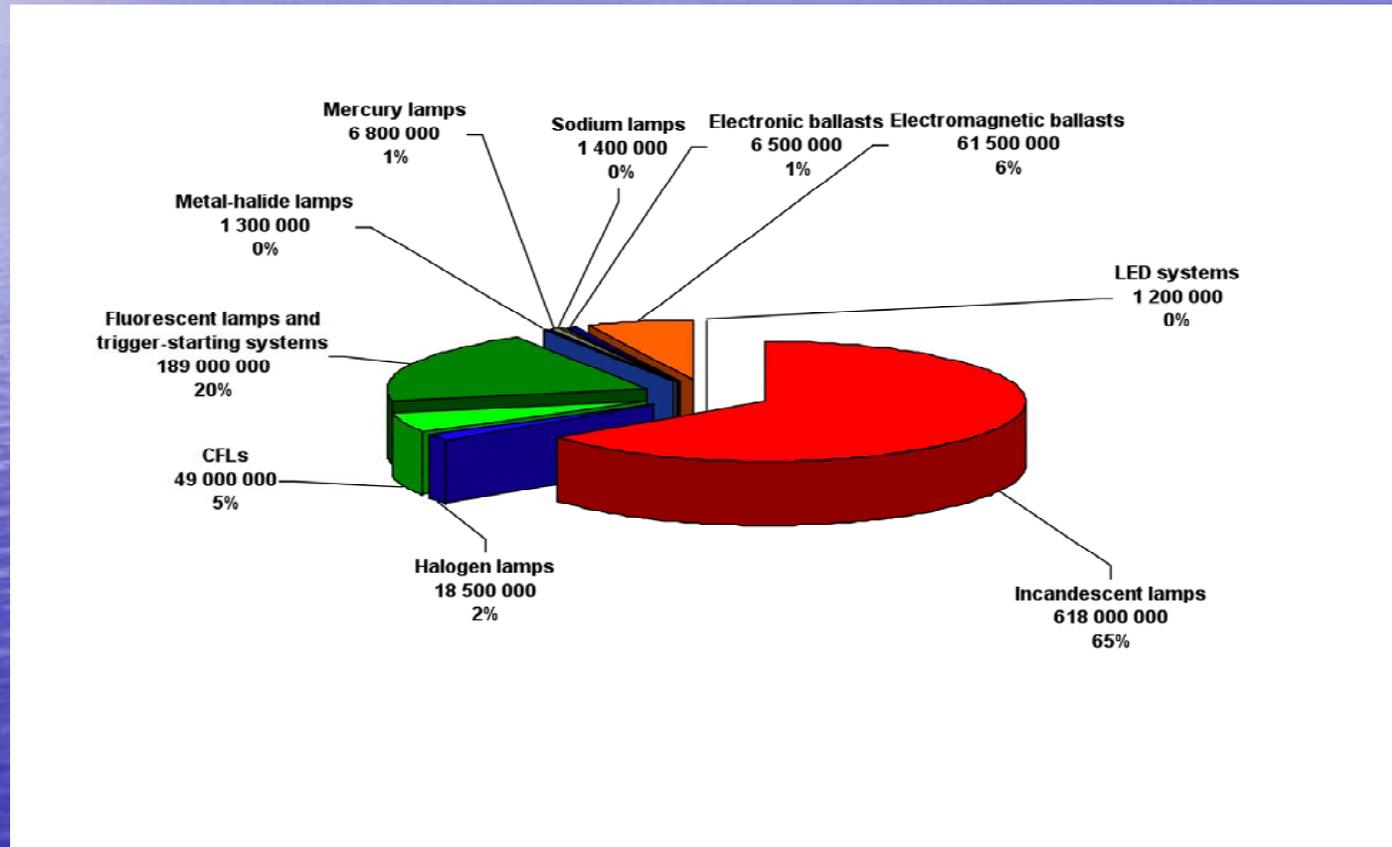
# Current Status of Energy Efficient Lighting in the Russian Federation

In 2007, annual power demand for lighting 57.5 TW, corresponding to electricity consumption of 137.5 TWh, or 14% of national electricity consumption, and to annual CO<sub>2</sub> emission of 69 Mtn. Table 1 shows energy consumption for lighting by economic sector as well as estimation for energy saving potential. The total lighting energy savings potential in Russia is enormous: 57 TWh per annum which is equivalent to approximately 28.5 Mtn CO<sub>2</sub> per annum. Commercial and industrial buildings account for more than 50% of lighting energy consumption.

**Table 1: Russian lighting consumption and technical potential for energy savings, by sector**

Group of lighting equipment	Established capacity, (GW)	Electric energy consumption, (GWh/year)	Potential energy saving, GW*h per year	Released capacity, GW
Industry and commercial buildings	28	85 000	30 000	10
Public, educational and state buildings	8	12 000	5 000	3
Street lighting	1.5	4 500	2 000	0.7
Residential sector (private sector)	15	20 000	13 000	10
Agricultural sector, including population.	5	16 000	7 000	2.5
<b>Total</b>	<b>57.5</b>	<b>137 500</b>	<b>57 000</b>	<b>26.2</b>

**Figure 1: Light sources technologies used in Russia  
(in number of units)**



## **Situation of Russian Lighting Market**

In 2008 the Russian market for lighting is estimated to be in the order of 1.6 billion Euros: 1.1 billion for lighting systems and fixtures and 0.5 billion Euros for light sources. Expenditure per capita and per annum for purchasing lamps in Russia is in the order of 2.28 €, while in Europe this figure is in the order of 7.5 € and 15.6€ in Japan.

The national lighting industry is declining. All in all, in 2007 the national production volume was estimated at 639 million lamps. Today, the national lighting industry produces in large majority incandescent lamps, some linear fluorescent lamps (T12, T10 and T8) and high-pressure mercury lamps. In parallel with the decline of national production, there has been a constant influx of imported products. The value of imports of electrical lamps in Russia is increasing. In 2003 lighting imports were valued at US\$ 30.8 million in 2006 this grew to US\$ 87 million, and was over US\$ 154 million in 2008. This represents a five-fold increase in five years.

Supply of Energy-Efficient Lighting technologies is currently limited in Russia. Only two factories in Russia produce fluorescent bulbs: LISMA Lighting and Smolensk-Svet.

Although all technologies are available in principle, there is virtually no domestic production of the most efficient technologies and supply is inadequate if market demand increases to the levels envisaged with this project. Manufacturers have indicated an interest in supplying more efficient lighting, but are yet to decide whether this supply should come from domestic production, international joint-ventures, or imports.

## **Modernization of Street Lighting Systems in the Nizhniy Novgorod Region**

Three projects of different size have been implemented in the Nizhniy Novgorod Region.

**Project 1.** Modernization of street lighting in settlements (Igumnovo, Petriyaevka, Yuryevets, Babino, Kolodkino) of the territorial district of Dzerzhinsk town.

Total population of five settlements is 2800 people. Before modernization, the street lighting system was in emergency condition. Inefficient illuminating equipment was used in the system. Before realization of project (2007) the system was operated with 448 streetlights including 314 mercury lamps and 134 incandescent lamps.

# **Financial mechanism is using now for project implementation in the Nizhniy Novgorod region**

## **Algorithm of funding procedure and credit return (step by step):**

- **Elaboration of a feasibility study and a business plan;**
- **Project approval at the meeting of the working group for project selection in the regional administration (technical approval of project solutions and project costs);**
- **If it is necessary to complete the feasibility study;**
- **Project justification at the meeting of “Commission for Energy and Resources Saving Project Selection” under the government of region;**
- **On the basis of positive decision the commission authorizes the special credit program for the project;**
- **Consideration of business plan and feasibility study by the bank;**
- **Signing the credit contract;**
- **Funding project by the bank (according to the time schedule);**
- **Municipal administration does step-by-step repayment of the main credit to the bank and partial repayment of the credit interest;**
- **Simultaneously with municipal administration Regional Ministry of Finance repays to the commercial bank a part of interest (usually 50% of the credit interest).**

- After justification of the project a municipal administration is authorized to manage the savings resulted from the project realization during the pay back period (according to the feasibility study and a business plan)

**Project 2.** Modernization of street lighting system in a small town Lyskovo.  
The town's resident population is 22,000 people.

**The street lighting system rehabilitation project for Lyskovo includes:**

- installation of 848 energy saving luminaries in the streets
- replacement of 10-15% of street light pole brackets
- installation of a power consumption control system at the power supply points
- installation of additional 46 outdoor luminaries with poles and a lighting network
- replacement of poles in poor condition

**Main results of the project:**

- reduction of electricity consumption by 49%
- reduction of operational costs by 50%
- 1.5 times improvement of street illumination in Lyskovo

## **Project 3. Modernization of street lighting in the town of the middle size Lyskovo. The town's resident population is 68,900 people.**

### **The street lighting system rehabilitation project for Kstovo includes:**

- installation of 2,600 outdoor energy-efficient luminaries;
- replacement of 10-15% of outdoor lighting pole brackets
- installation of electric power metering systems at delivery points
- installation of a variable power control system for luminaries in the city centre (5 control cabinets).

### **Main results of the project:**

- electricity consumption reduction by 55 %
- reduction of operational costs by 40-50 %
- improvement of street illumination in Kstovo

**Project investment totalled 10.613 million rubbles**

**Energy savings, million RUB per year 2.47**

**Operational cost savings, million RUB per year 1.59**

**Cumulative economic effect, million RUB per year 4.06**

**Payback period, years 2.6**

## **Project Goal and Objective**

**A project has been selected and formulated on the basis of the results that have been achieved after realization of three local projects in the Nizhniy Novgorod region**

- The objective of the selected project is to transform the national market for efficient lighting and to phase-out inefficient lighting, and reducing national GHG emissions. All lighting sectors are concerned: household, health and education buildings, and street lighting.
- The main project goal is to promote efficient lighting technologies (CFLs, T5 & T8 linear Fluorescent lamps with electronic ballasts, Ceramic Metal Halide lamps, centralized control systems, efficient fixtures and LED) and to modernizing state regulations, standards and their respective enforcement mechanisms in order to transform the national lighting market. The project will contribute also to phasing-out inefficient lighting technologies (bulbs, fixtures and ballasts).

To achieve this ambitious goal, the project will promote high quality efficient Lighting systems based on widely accessible arguments, training, socio-economic knowledge, standardization, extra legislation and incisive.

The following “fishbone” graphics illustrates all the above issues.



## Financial resources for project implementation

- The selected project co-funded by GEF, the government, private sector and international partners. Obtaining co-funding support from non-traditional sources is also a key to the project's future effectiveness and so pilot sites were chosen in part based upon the level of promise or success to date in sourcing this kind of funding or support.
- The total cost of the projects: 72,750,000\$; GEF as co-financing has provided 7,020,000\$; the central government-20,000,000\$; regional governments: Moscow-11,950,000\$, Nizhniy Novgorod-12,800,000\$; private sector and international investors-20,980,000\$

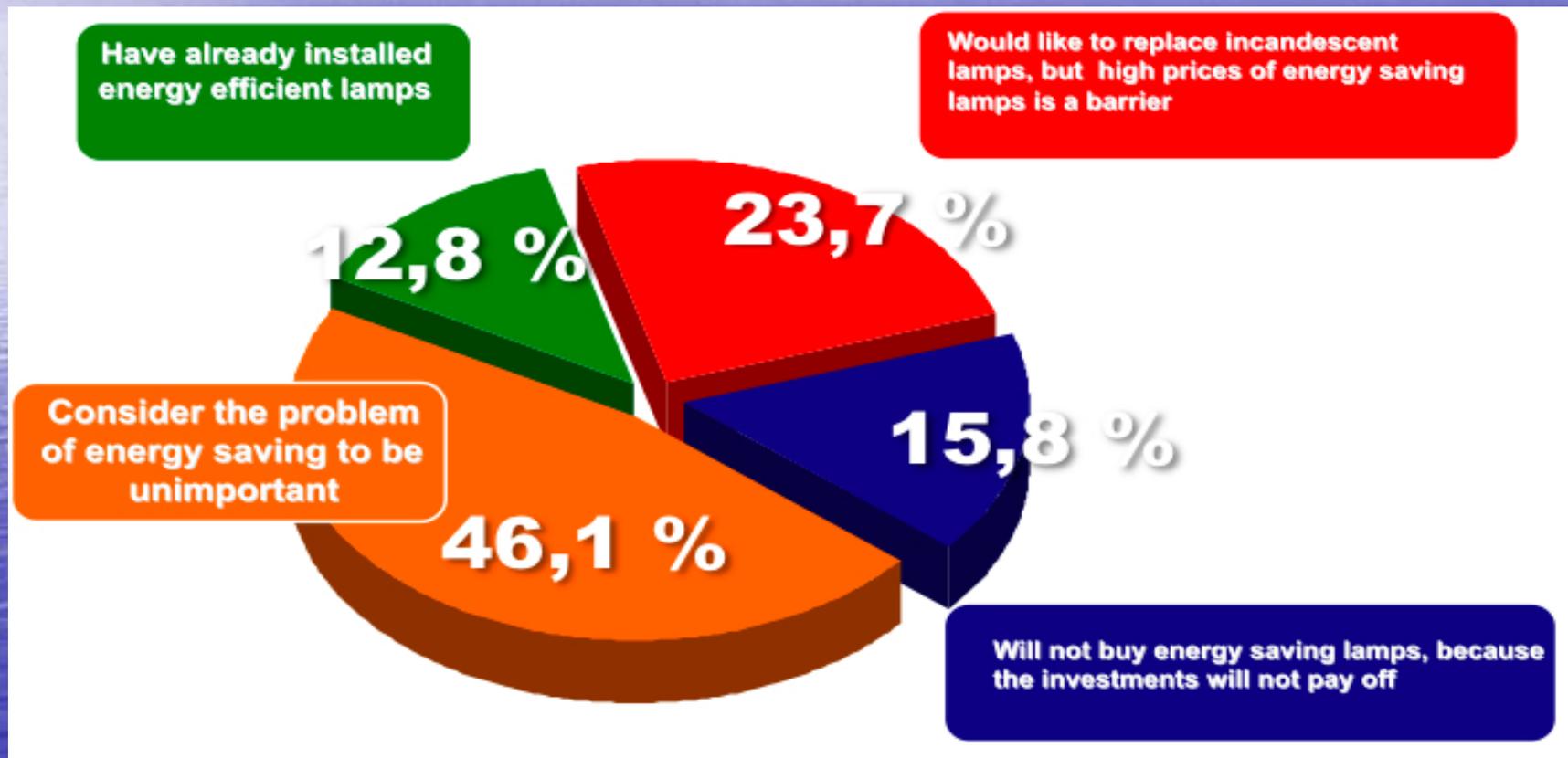
### Barrier analysis

- **Regulations:** the existing technical standards for energy efficiency for buildings are very poor compared to any other western country and this creates no incentives for production or sales of highly efficient lighting products.
- **Enforcement:** Russia currently has no enforcement regarding energy efficiency of lighting systems.
- **Certification:** There are no mandatory tests for energy efficacy and lighting system quality.
- **Coordination:** Unlike other countries, Russia does not have an institutional body to coordinate lighting activities.

## Barriers linked to education and awareness

- Consumers are typically not aware of energy saving potential of Compact Fluorescent Lamp (CFL).
- Payback time in Russia is rather long. This is due to the fact that kWh price in Russia is in the order of 3 rubbles (7 eurocents) when in other western countries this ranges from 10 to 15 eurocents/kWh.
- End-users typically cannot distinguish low and high quality CFLs.
- Many Russians are still unaware of the environmental and economic benefits of efficient lighting.
- Lack of energy management expertise and practices, especially in the national industries and municipal sector (this includes administrations, education, health buildings).
- Energy efficient solutions are expensive in Russia and more especially for individual end-users. Today Russian consumers can find CFLs at prices ranging from 100 up to 400 rubles. This is still high when the average price for an incandescent lamp is 15-20 rubles.
- The quality of CFL products is not constant. The “quality” is measured here by the lifetime (a good CFL typically has a rated lifetime of 6000 h life, a low quality lamp has a shorter lifetime and limited reliability).
- Lack of technical supervision of import commodities led to flooding of the domestic market with lighting products of dubious quality, coming from both legal imports and an important shadow market.

## Answers of residential end-users in Moscow concerning the reasons that aren't using CFLs at home.



## **The present project will support the federal government to undertake the following actions:**

- Set standards for energy efficient lighting technologies.
- Update existing regulations for the energy performance and quality of lighting systems installed in major applications like commercial buildings, new residential construction, street lighting, and industrial lighting.
- Develop efficient enforcement processes and associated indicators.
- Provide information and training to lighting specifiers, designers and installers; educate the public at large about the benefits of efficient lighting.
- Ensure that the energy costs and performance of lighting are visible in the market by labeling the energy performance of equipment and certifying the performance of entire light-using systems such as buildings and outdoor lighting.
- Encourage better building design with more effective use of daylight.
- Lead by example through pioneering efficient-lighting technologies and practices in their own buildings and by setting appropriately ambitious targets.

# Results to be Achieved after Implementation of the Selected Project

- **Result 1: Improvement in the efficient lighting standards and policy framework. The project will establish the Federal Energy Efficient Lighting Council (FEELC). This council will be placed under the auspices of the Ministry of Energy.**
- **Result 2: Support the supply chain for EE lighting. Under the auspices of FEELC a national EE lighting action plan will be developed to allow for the gradual phase-out of inefficient lighting devices through such measures as phase-out of electromagnetic ballasts for fluorescent lamps (in new construction and rehabilitation).**
- **Result 3: Penetration of energy-efficient lighting increases in Moscow homes and buildings, and the initiatives are replicated elsewhere. A key part of the project is to demonstrate improved practices related to overcoming barriers in three pilot sites: (1) Schools and hospitals in the Moscow; (2) residential areas in the Moscow region.**
- **Result 4: Energy-efficient street lighting is adopted in Nizhny Novgorod region and local EEL initiatives are replicated elsewhere. The pilot in the Nizhniy Novgorod oblast involves modernization of street lighting including the replacement of incandescent lamps (50 lm/W) and high-pressure mercury lamps (50 lm/W) with lighting fixtures (IP 65 class) with metal halide lamps (90 lm/W) and other new energy efficient technologies.**

## **Benefits from the project**

**National benefits will be three-fold.**

- **First, thanks to energy savings from the project, projected to be about 4 TWh annually by project close, the Russian Federation will be able to avoid building approximately eight to nine 900 MW-power plants.**
- **Second, the project is expected to increase the quality of and demand for energy-efficient lighting products manufactured in Russia. This will stimulate the local economy. On the other hand, as actual average level of light (in lux) in the public and tertiary sector is very low and the introduction of new standards similar to western countries will imply an increase of the light level, and of course moderate energy consumption increase.**
- **The pilots in Moscow, Moscow and Nizhny Novgorod regions are being realized within the project and then will be replicated in five other regions.**



**THANK YOU FOR YOUR ATTENTION!**