Title: Scaling up the Energy Service Company Business: Market Status and Company Feedback in the Russian Federation

Authors: Volha Roshchanka^a and Meredydd Evans^b

^a Earth System Science Interdisciplinary Center, University of Maryland, 5825 University Research Court, Suite 3500, College Park, MD 20742 USA. E-mail: volhar@umd.edu

^b Joint Global Change Research Institute/Pacific Northwest National Laboratory, 5825 University Research Court, Suite 3500, College Park, MD 20742 USA. E-mail: m.evans@pnnl.gov

Corresponding author: Volha Roshchanka, Earth Systems Science Interdisciplinary Center/Joint Global Change Research Institute, University of Maryland, 5825 University Research Court, Suite 3500, College Park, MD 20742, USA
E-mail address: volhar@umd.edu, Phone: +1 301-405-1402, Fax: +1 301-314-6719

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Abstract

Many energy efficiency professionals have proposed using Energy Performance Contracts (EPCs) as a mechanism to improve public sector energy efficiency in countries with restrictive government budgets. However, in practice, most middle-income countries have used this mechanism only in a limited way. Russia offers an interesting case study because of its huge energy savings opportunities, increasing energy prices, robust political backing for public sector energy efficiency, and evolving legislation that supports EPCs. In 2009, the Russian Federation initiated reductions in the country's energy intensity, including of the large public sector, which accounts for 9 percent of Russia's total energy consumption. To achieve energy efficiency goals in the public sector, Russia experimented with its public procurement rules, adjusting them to encourage EPCs. We reviewed the Russian government's official public database, conducted structured interviews with Energy Service Companies (ESCOs) in Russia and supplemented them with online research. Even though this process might not have captured all of the EPCs signed in Russia as of mid-2013, we estimate that nearly 50 ESCOs signed about 150 contracts in public facilities. Most ESCO contracts in Russia are for 5 years, and they generally are small (under \$100,000). ESCOs in Russia face a challenging environment, which leads to smaller projects. ESCOs also are concerned about costly and risky tender procedures, uncertainty regarding repayment from public facilities, the inability to expand projects, and financing. We discuss these challenges and propose potential solutions at policy and company levels. The ESCOs feedback regarding Russia's experimental model can inform the country's program for public sector energy efficiency and offer lessons for other countries attempting to develop the EPC mechanism.

Keywords: energy performance contract, energy service company, energy saving, public sector energy efficiency, procurement, Russian Federation

1. Introduction

Many countries have attempted to use Energy Performance Contracts (EPCs) as a mechanism for improving energy efficiency in the public, industrial, and other sectors. Because energy efficiency services are paid for by money saved from reduced energy consumption and require no upfront capital investments, EPCs offer an attractive means to financing energy-savings projects. Companies providing energy efficiency services, referred to as “Energy Service Companies”, or ESCOs, guarantee energy savings based on an energy audit of the facility, as well as their expertise in managing energy efficiency. These legal guarantees help secure external financing for construction, installation, and maintenance.

Under the right conditions, using EPCs to improve energy efficiency in the public sector is beneficial to all parties, making them especially appealing. For public facility managers, EPCs are a mechanism to transfer the technical risks of energy efficiency performance to an engineering-savvy company. For ESCOs, the public sector offers an exciting opportunity to conduct business with a public-sector leader. For taxpayers, EPCs help effectively manage public funds, stretching tax dollars while also reducing emissions and improving energy security.

Given these benefits, energy efficiency improvements tend to enjoy broad endorsement. However, application of the EPC mechanism for energy efficiency improvements has not been as widespread as expected. Researchers describe various barriers for this lag, such as lack of adequate legal framework, budgeting and standardized procurement rules, low energy prices, political uncertainty, and others (Marino et al., 2011; Painuly et al., 2003; Vine, 2005).

Russia recently modified its public procurement rules to allow the use of EPCs to improve energy efficiency in public facilities. The country presents an interesting case study because of the significant opportunities in energy efficiency combined with increasing energy prices, political support for the ESCO mechanism over the past several years, and evolving energy and procurement legislation. In this paper, we describe the status of the Russian ESCO market; share feedback from structured discussions with Russian ESCOs about their challenges; and propose solutions to address these challenges at policy and company levels.

The information in this paper will be most relevant to policymakers, researchers, and other professionals working to advance the EPC mechanism to improve energy efficiency around the world. This field assessment report presents a distinct opportunity to learn about the struggles for ESCOs following the formal launch of the mechanism in an emerging economy. We hope this research will contribute to the growing body of knowledge and international platforms, such as Energy Services Expert Platform of Task 16 of the International Energy Agency’s Demand-Side Management Programme. In turn, Russia can also learn from such initiatives that share valuable examples and expertise from other countries, particularly when they share specific and practical solutions, business models, policies and best practices (European Parliament, 2012).

1.1. Energy Efficiency Policy in Russia

As one of the most energy-intensive countries in the world, Russia has enormous potential for energy savings. The International Energy Agency (IEA) estimated that if each Russian economic sector used energy as efficiently as comparable Organisation for Economic Co-operation and Development (OECD)-member countries, Russia could have saved more than 200 million tonnes of oil equivalent (Mtoe) from its primary demand in 2008, or about 30 percent of its consumption (IEA, 2011). The International Finance Corporation and World Bank estimated that energy efficiency investments in Russian buildings could save up to 69 Mtoe per year (IFC and World Bank 2008). This potential provides a good foundation for launching an ESCO industry in Russia.

At the same time, energy prices have substantially increased over the past decade. The average natural gas price for Russian industry rose from \$0.40 per million British thermal units (MBtu), or \$0.38 per gigajoule (GJ), in 2000 to \$2.80/MBtu, or \$2.65 per GJ, in 2010 (IEA, 2011). Similarly, residential consumer tariffs for electricity increased by a factor of 6, from \$0.014 per kilowatt-hour (kWh) in 2000 to \$0.087 per kWh in 2012 (Figure 1). In comparison, the average retail price for residential consumers in the United States in December 2012 was \$0.116 per kWh (EIA, 2013). District heating accounts for a large portion of energy consumption in Russia: about one-third of the primary energy consumption. Traditionally, policymakers kept district heating tariffs low, which discouraged investment and upgrades. However, heat tariffs also have grown. For instance, residents of Sochi pay about 1,800 rubles (RUB) per gigacalorie (Gcal)—\$55 per Gcal or \$47.3 per MWh (Federal Tariff Service, 2013). Although average district heating tariffs in Russia (\$17.8 per MWh) continue to be well below European district heating prices, tariffs in some regions are beginning to approximate the European tariff range (\$61 to \$150 per MWh¹) (Hyvrynen, 2013). The increase in energy prices for all consumers has been an important motivating factor for promoting energy efficiency improvements nationally.

¹ €1 = \$0.7532 (oanda.com).

Figure 1. Growth in national average electricity tariffs for residential consumers in the Russian Federation between 2000 and 2012. Data are for the end of each year in U.S. dollars (Source: Rosstat, 2013).

The Russian government launched a national initiative for systematic energy efficiency improvements in public buildings and facilities and showed strong political support for these changes. The 2009 Federal Law on Energy Efficiency FZ-261 required that public facilities reduce their energy consumption by 15 percent over 5 years (although the deadline is pending extension) (Russian Federation, 2009). At the same time, The Russian government adopted a number of legislative acts and more specific regulations to create a framework for EPCs in the public sector (see Table 1). This framework has been flexible and responsive to market feedback. This has aided the introduction of EPCs in the public sector, even though many mechanisms for successful implementation continue to require effort.

Table 1. Recent Russian legislation to improve public sector energy efficiency (Compiled from legal database www.consultant.ru).

Regulation	Year	Significance
Federal Law on Energy Efficiency FZ-261	2009	Demands that public facilities reduce their energy consumption by 15 percent by the end of 2014 under “comparable conditions,” using 2009 as the baseline year. Phases out the use of incandescent light bulbs. Obliges public facilities to undergo energy audits, install meters, and obtain energy certificates.
Amendment to the Budget Code	2009	Allows public facilities to enter into EPCs, where the cost is expressed as a percentage of saved energy resources.
Amendment to the Federal Law on Public Procurement FZ-94	2009	Establishes rules for procuring EPCs for public facilities.
Federal Law FZ-83 on Amending the Status of Public Facilities	2010	Reorganizes public facilities into three classifications: <i>treasury</i> , <i>budget</i> , or <i>autonomous</i> .
Government Decree No. 636 on Requirements for EPCs and Contract Pricing	2010	Describes some requirements for EPCs and EPCs pricing in the public sector.
Order of Ministry of Economic Development No. 591 on Calculating Savings in Public Facilities under Baseline Conditions	2011	Provides formulas for calculating savings in public facilities for evaluating compliance with the energy consumption reduction goals.
Plan of Activities to Refine Government Regulation of Energy Services	2013	Adopted at a meeting of the Presidium of Council under the President of Russian Federation for Economic Modernization and Innovative Development of Russia, the plan instructs agencies to develop specific regulations and standards to assist managing all aspects of EPCs.
Federal Law FZ-44 on the Contract System in State and Municipal Procurement of Goods, Works and Services	2013	Allows two-stage tenders when procuring EPCs in public facilities.

In addition to this legislative support, the Russian government organized energy efficiency and energy efficiency services training for energy managers and other officials in public facilities. Regional governments ordered studies of local opportunities in energy efficiency. In 2010, the Russian

government started a program entitled, “Energy Saving and Increasing Energy Efficiency until 2020,”² which provides 695 billion RUB (about \$20 billion) for public sector energy efficiency. The program also envisions that the private sector will provide the majority of financing (more than 10 times the government-allocated budget), including via the EPC mechanism. The government estimates that by 2020, the program will save close to 1.4 billion tonnes of oil equivalent (toe) (Ministry of Energy of the Russian Federation, 2010).

1.2. Energy Efficiency Opportunities in the Russian Public Sector

The Russian public sector has great potential for energy savings. Similar to other countries, the Russian public sector does not suffer from the split incentive issue, as occupants usually own facilities. This makes the public sector the low-hanging fruit in pursuing energy efficiency. The Russian public sector accounts for roughly 9 percent of the total end-use consumption. This estimate includes district heating systems that are owned and/or operated by municipal companies. Thus, the scope of public sector in Russia is much larger than many countries. As an example of the savings potential, some ESCOs reported saving more than 60 percent of energy use in municipal street lighting projects and over 50 percent of total energy consumed in one hospital. Although such savings may not be typical of all buildings, they are possible in Russia’s colder climates. The legal obligations facing public facilities to reduce energy consumption make the public sector a significant stepping stone for the ESCO industry.

Much of the energy savings potential is accessible through upgrades in technologies. For example, by installing energy meters and controls, facilities can reduce their energy consumption when not in use (usually at night) and optimize energy use during seasons when outside temperatures fluctuate (usually spring and fall). Such energy efficiency measures can be particularly effective in administrative regions where energy costs are high, and the spring and fall seasons are long.

Among municipal public facilities, the most common types are educational institutions (such as schools, daycare centers, universities, university housing, and vocational schools), culture and art facilities (libraries, museums, and theaters), medical facilities, and sports facilities (Figure 2).

² This program was cancelled in 2013 and replaced by a similar program in 2014. The new program allocates 91 billion RUB (about \$2 billion) for energy efficiency and energy sector development in 2013- 2020, whereas it estimates that 28 trillion RUB (about \$700 billion) is needed. Support of EPCs is a major activity under the first sub-program (a total of seven subprograms).

Figure 2. Number of municipal public facilities for each facility type (Source: Russian Statistical Yearbook 2012).

Generally, most of the energy consumed by public facilities is for space heating (about 60 percent), presenting the largest opportunity for savings. District heating provides most of the heat (about 60 percent). Electricity is the second most important energy type: it powers appliances, lighting, and cooking. Recent research has shown that the market for cooling equipment is one of the fastest growing in Europe, and thus the role of cooling appliances and electric consumption is growing (Lychuk et al., 2013). The averages would vary somewhat by sector. For example, daycare centers consume much of their electricity for cooking, whereas universities use electricity primarily for lighting and appliances. In hospitals, the primary electricity consumer is medical equipment with lighting coming in second.

The Russian district heating sector presents another opportunity for energy efficiency upgrades, including through the EPC mechanism, although publicly-owned district heating facilities follow a different procurement process. The Russian district heating sector, which supplies heat to about 73 percent of Russia's population during the winter, is among the country's top energy consumers. Given its infrastructure's size and age, the sector presents an extremely large energy saving potential. Both production facilities and heat supply networks are in dire need of upgrades, exacerbated by decades of underinvestment (Roshchanka and Evans, 2012; IEA, 2011). Compared to Western European distribution network losses of 5 to 10 percent, losses in Russian networks are much greater, estimated at about 20 percent. Investment in district heating has been challenging because of non-cost-reflective prices (tariffs) and poor payment discipline motivated by poor service quality (IEA, 2004). However, the heat tariffs have been growing recently, increasing up to 25 percent in some regions in the past few years. Russian legislators also have been striving to allow flexibility and attract much-needed investments to the sector. Because of new legislation, some investors have begun to sign concession agreements with municipalities to allow for investments and repayments through heat sales.

In summary, the Russian public sector has the potential to offer a large stream of energy efficiency projects for ESCOs, and in each project, the ESCOs would need to tailor make their solutions.

2. Methodology

In this paper, we report on the status of EPC development in Russia (to date) and provide recommendations aimed at increasing the success and expansion of the Russian model. To analyze the EPC market status in Russia, we collected information from the Russian government's official public contracts database (www.zakupki.gov.ru) and online ESCOs database compiled by the Russian Energy Agency (<http://gisee.ru/structures/>), supplementing that information with online research. This multi-source approach aimed to capture the most information available on the Russian EPC market. However, it is likely that we did not capture all EPCs signed by mid-2013. For example, the government's official public database might not have contained very small energy efficiency contracts, as they are not required to be entered into the database. In addition, we heard that the Republic of Yakutia piloted a number of small EPCs, but could not obtain more information neither through the government database/interviews nor through online research. We also developed a list of ESCOs working with the Russian public sector. In Russia, companies commonly call themselves an energy service company if they offer upgrades to energy equipment and facilities and perform audits and meter installations, but do not necessarily offer EPCs. Our intention was to include only companies that offer energy efficiency services largely paid for by money saved from reduced energy consumption and, therefore, meet our definition of ESCOs. We performed online research to ensure that companies did, in fact, offer EPC services that are primarily paid for by money saved from reduced energy consumption.

In May of 2013, we corresponded by email and/or phone to 19 ESCOs that have pursued EPCs with public facilities. Of these, 9 ESCOs agreed to discuss their experience with EPCs in the public sector. Via phone or email, we asked respondents a set of questions that focused on understanding their experience at each stage of the EPC project cycle. Typical questions included:

- What types of projects in the public sector did you bid for? Who was the government client/owner? What was the size of projects you contracted?
- What was your experience like when you initially approached the potential client?
- Did you help the client formulate and post the bid?
- Did you get a walk-through of the site? Could you visit it to collect necessary data? Were all included facilities visited?
- Were you able to gather all of the information you needed to submit a quality proposal?
- What were some challenging aspects in signing the contract? What were some successful aspects of signing the contract?
- Were you able to adjust your guarantee after signing the contract (if needed)?
- What kind of financing was arranged? How were you able to evaluate credit risk?
- Who operated/was going to operate and manage the facility post-construction?
- Were you paid in accordance with your agreements and on time?
- Did savings materialize as expected? Were the savings above or below the guaranteed level? What were some challenging aspects of monitoring and verifying savings?
- Were you able to profit from the project? Would you take on this kind of project again?
- Did you feel you needed to take on too much risk? How could some risks have been avoided?

We received fairly detailed information, which was supplemented with insights from past collaboration with Russia's federal and regional officials. This approach added nuance to our more structured discussions with ESCOs and the analysis of the government procurement database. Our approach gears towards qualitative assessment of the Russian ESCO market and differs from macro-level, multi-country surveys of barriers to EPCs conducted by other researchers (Painuly et al., 2003; Vine, 2005).

We based the analysis on our understanding of academic and gray literature documenting experiences with EPCs in various countries, our knowledge of the U.S. EPC model, as well as observations from other countries that have worked to adopt this mechanism.

3. Current Status of the Russian ESCO Market

In recent years, Russia has experienced a surge in the number of ESCOs. The earliest literature indicated that there were 4 to 15 ESCOs in Russia in 2009 (Hansen et al., 2011). By the end of 2011, Garbuzova and Madlener (2012) reported finding about 30 ESCOs. As the market is continuously evolving, it is difficult to estimate the size of Russia's EPC market. Based on the fact that, on average, each ESCO had signed about 3 contracts, we estimate about 50 ESCOs offered energy efficiency services to public facilities across Russia by mid-2013. A few more ESCOs offered services exclusively in other sectors. However, we focused on ESCOs working with the public sector, partially because of the vast opportunities that exist in the sector and the fact that most ESCOs are likely to enter markets through projects in public facilities.

The market is more advanced in larger cities, such as Moscow, Saint Petersburg, Novosibirsk, Petrozavodsk, Nizhny Novgorod, and Yekaterinburg. About half of the ESCOs have offices in Moscow, although they may perform projects elsewhere. However, more and more regions across Russia are initiating EPCs. Some of the most active ESCOs are subsidiaries of energy providers.

On average, each ESCO has 3 projects in its portfolio, but this number varies from company to company with the largest number of projects (17) performed by Gazprombank-Energoeffekt, a subsidiary of one of Russia's largest banks, Gazprombank. Having access to a bank, Gazprombank-Energoeffekt also offers refinancing of EPC projects for other ESCOs. The average length of EPCs in Russia is about 5 years, with the longest known project signed for 8 years and the shortest for 1 year.

Public-sector projects usually are small (under \$100,000) and simple (mostly heat and lighting controls). Yet, even simple projects typically are able to yield at least 20-30 percent savings, thereby meeting the legally required savings for public facilities. For a new market such as Russia, getting a critical mass of small and simple EPC projects is an achievement. We estimate that public entities commissioned close to 150 EPC projects between 2009 and mid-2013. However, the market is dispersed, and each project tends to have very limited competition.

When examined as its own category, street lighting projects appear to be 10 times larger on average in terms of investment size than projects in other facilities. These projects are especially viable for EPCs in Russia because they are fairly simple to negotiate and commission, resulting in lower transaction costs. In addition, street lighting projects can be grouped under one client (municipality), making them particularly profitable in larger cities. Several companies, Gazprombank-Energoeffekt, IT Energo Finance, and OOO Kaskad-Energo, completed large street lighting projects in Bryansk and Bryansk Region, Kirov, and Kaluga. The project size varied from 20 million to 125 million RUB (approximately, \$600,000 to \$3 million). The companies offered to guarantee savings of approximately 35 percent and reported actual electricity savings of 42 to 69 percent during the 3-7 year contract period. Omsk, Samara, Volgograd, Tver, and even groups of villages in other municipalities also completed street lighting projects.

Through detailed discussions with ESCOs, we gained insight into the project cycle of EPCs, from the public project announcement to project closure. Not much time has passed since the EPC mechanism's launch, and, clearly, both ESCOs and public facilities had little experience with EPCs and lacked clarity about the process. It is not surprising that almost all ESCOs performing EPC projects in buildings admitted taking on significant risks, such as high pre-signing expenses. Most companies had to invest substantial resources in project design and planning before the contract was signed. Because most public facility managers were not familiar with EPCs, issuing the Request for Proposal (RFP) and tender procedure took substantial time and effort, including on the part of the ESCOs that often assisted with preparing tender documentation. In some cases, the ESCOs reported they invested up to 10 percent of the project value before signing the contract.

Although ESCOs reported taking on many risks when undertaking these EPC projects, their motivations for assuming high risks were because of perceived political pressure or a desire for political support; most did not have any competitors for individual projects. This might have helped move some projects forward. Still, as the market evolves, this model will have to adjust, particularly the policy work must devise mechanisms for balancing risks and reducing transaction costs.

ESCOs in Russia did not perform investment-grade audits. Instead, companies walked through the facility and collected data with their own equipment prior to bidding. Because of the simplicity of projects, companies reported that a walk-through usually was sufficient. However, this also forced companies to propose only simple projects with high returns rather than more comprehensive retrofits or projects involving renewable energy. A new law, FZ-44 (see Table 1), introduced a two-stage tender beginning January 1, 2014 (Russian Federation, 2013). A two-stage tender process has the potential to stimulate more complex projects by reducing risks for ESCOs before awards and adding flexibility to adjust measures as ESCOs learn more about the site.

Few ESCOs³ used third-party financing for their projects. Firstly, small-scale projects made self-financing feasible, especially for larger companies. Secondly, obtaining financing from a third party is challenging without a co-signer or municipal guarantee that the facility will repay the debt. All ESCOs

³ The notable exceptions are two ESCOs, one of which was subsidiary of a bank and another had a parent company co-sign on a loan.

reported that the inability of municipalities/facilities to issue higher-level guarantees was the largest obstacle. Essentially, ESCOs assumed the financial risks, at times relying on informal agreements. For instance, some ESCOs obtained informal, verbal commitments either from facility managers or from municipal authorities.

Few companies reported issues with repayments, which might not speak for all public facilities but more for the projects the ESCOs selected. Many of the ESCOs interviewed had a local presence where they had projects and were familiar with the local conditions and authorities.

Several ESCOs reported administrative difficulties with receiving payments. Municipal treasuries may not yet be familiar with this type of payment, which could result in delays. For this reason, companies and clients often chose to get paid infrequently, biannually, or quarterly. As EPCs become more common, treasury departments and ESCOs likely will resolve these administrative issues.

When designing and installing energy conservation measures, public facilities managers usually are “hands-off” in their approach (although they must approve installations). As typical in other countries, ESCOs are responsible for getting the necessary permits and certifications to ensure that installations (or construction) are up to code. After they installed equipment, ESCOs typically continued to own it until the project’s conclusion. However, some ESCOs indicated it is virtually impossible for ESCOs to uninstall the equipment. Therefore, ownership was not a valuable asset.

Because EPCs in Russia last only about 5 years, a short term by comparison with many countries with established EPC markets, high-risk, high-transaction costs and lack of third-party financing limit ESCOs to simple, fast payback projects. Others expressed concerns about the future of the Russian economy in general and were unwilling to have their assets tied up in longer projects.

Although the risks and costs are steep, ESCOs reported energy savings were at least as high as they expected and, in most cases, quite a bit more than guaranteed. As such, the companies did recognize there was great growth potential for the market.

We aimed to collect qualitative data about the challenges ESCOs face working with the public sector in Russia. However, Table 2 summarizes our results: the number of responses we got on the issues the ESCOs in Russia to continuing and/or scaling up their business.

Table 2. Top issues identified by ESCOs in Russia as the biggest challenges (multiple responses allowed).

Identified Issues	Number of Responses
Tender process is too costly and risky	9
There is no guarantee that public facilities will repay the debt	9
Bundling several projects under one client is not permitted (excluding street lighting)	8
Proposing or winning complex projects is not feasible	7
Access to financing is lacking	6
Quantifying actual savings is challenging	4

These results provide insight into the challenges ESCOs face following the launch of the EPC mechanism and can help policymakers and other professionals in designing programs and legislative solutions to support EPC mechanisms in various countries.

4. Discussion of Observed Issues and Potential Solutions

The ESCOs identified a number of issues that hinder their business success and pursuit of other EPC opportunities. Both policymakers and ESCOs have roles in developing strategies to make the EPC market work. Even in established EPC markets, public facilities, policymakers, and companies continue to experiment and identify new approaches for capturing energy efficiency potential.

This section offers suggestions for dealing with issues identified by ESCOs in Russia drawing on experience in the United States and other countries. Russian stakeholders may choose to tailor these approaches to their own situation, where relevant. Most of these approaches focus on either reducing transaction costs or balancing risks.

4.1.Reducing the costs and risks of the tender process

Public facility managers may be familiar with public procurement processes, but EPC procurement usually is more complex. In addition, these managers might not be aware of the benefits of energy efficiency projects, and ESCOs must engage substantial effort into convincing them of EPC project benefits. Such obstacles were also reported by Pätäri and Sinkkonen (2013) in their study of Finnish ESCOs, and authors suggest that investments in ESCO projects require facilitation and combining of resources with other actors in the field.

In Russia, ESCOs tend to develop tender documentation for the client before they place their bid. This strategy eases the tender process for the client, but creates extra costs and risks for ESCOs. In a competitive environment, ESCOs cannot be sure they will win the project following their initial investment. Similarly, public facilities cannot guarantee they get the best proposal and contract terms. ESCOs preparing tender documentation, even the best-intentioned, are, at best, in a situation of conflict of interest, or they may even be acting illegally (when not allowed by law). Thus, without proper government support for public facilities to develop tender documentation and complete the bidding process, ESCOs are in an uncomfortable position, which will impede market growth.

Government support for procurement could include a dedicated agency that assists with preparing tender documentation. In the United States, the U.S. Department of Energy's (DOE) Federal Energy Management Program (FEMP) offers substantial resources for federal agencies attempting to reduce energy consumption. In fact, DOE's dedicated assistance is regarded as one of the key reasons behind the successful EPC market. Through a one-stop website, DOE offers public agencies access to numerous, no-cost resources that include:

- **Contract structure** that allows facility managers and ESCOs to effectively balance risks and reduce costs

- **Software and analytical tools**, such as the Energy and Cost Savings Calculator, FEMP Solar Hot Water Calculator, the Facility Energy Decision System (FEDS), and others
- **Project and decision support** through *Federal Financing Specialists*, who help with structuring projects, training, advice on whether the projects are feasible, and forming an agency's acquisition team; and *Project Facilitators*, who provide consultations on contracts, funding, technology, and measurement and verification (M&V) processes; review cost and technical proposals; and draft the agency's task order request for proposal. Both specialist types are provided at no cost to agencies, at least through the point when bidding documentation is issued.
- **Technical assistance** through DOE national laboratories and other DOE-organized experts (though agencies cover some of the costs and need to demonstrate commitment)
- **Training**, such as online webinars, guides on institutional change, and on-site training
- **Qualification of ESCOs** by a qualification review board comprised of DOE staff
- **Federal awards and recognition** for excellent energy and water management
- **Informational support**, such as Question & Answer fliers, publications, information about legislation and state incentives for reducing energy consumption, materials on procuring energy efficient products, case studies, and best practices descriptions.

All of these tools help ensure that the transaction costs and risks are low for both federal agencies and ESCOs. Another important achievement of DOE's FEMP program is creating and managing a contract structure (FEMP, 2011). To reduce costs, FEMP streamlined the procurement process via Super Energy Service Performance Contracts (Super ESPCs). Under this mechanism, DOE bids out about 15 Indefinite Delivery/Indefinite Quantity (IDIQ) contracts. Then, companies compete for these contracts every 5 years. ESCOs that win Super ESPC contracts are allowed to propose energy conservation projects, which can save government agencies time. In addition, the high volume of projects under IDIQ contracts helps government agencies get the best terms. The mechanism prequalifies ESCOs based on a range of expertise and depth of experience. Hence, public facility managers know they are dealing with qualified, trustworthy companies. By prequalifying a subset of ESCOs to offer energy efficiency services to public facilities, the FEMP program significantly reduces the risks and transaction costs for ESCOs and building facility managers. This shows how FEMP adjusted procurement policies when the market was more mature and few companies attempted to enter. Other countries also might establish a program to manage the contract structure as the market changes.

Table 3. Recommendations on how to reduce transaction costs and risks related to the procurement process.

Recommendations for Policymakers	Recommendations for ESCOs
Provide public facility managers with training and positive incentives (including non-monetary) for taking on energy efficiency projects.	Enlist high-level political support.
Consider establishing a program or an agency to help public facility managers navigate the EPC procurement process, make the best ESCO contractor selection, and	To learn about and educate the client, consider competing for government grants and contracts that establish training programs for public facility managers.

understand energy conservation measures.

Reward and/or publicly recognize facility managers who take initiative to bid out an EPC contract.

Consider Super ESPC contracts or other ways to pre-qualify firms to reduce transaction costs.

Suggest using model tender documents as a starting point for negotiations.

4.2. Improving the tender procedure to allow for more complex projects

Getting even small and simple projects off the ground has been a challenge for many countries, particularly those facing such challenges as currency value decline, inflation, government instability, systematic non-payments. The Russian economy has many of these challenges, and this explains ESCOs unwillingness to invest in long-term projects. In the context of these challenges, the launch of the ESCO model in Russia has been fairly successful. However, consistent effort is needed to address further challenges, such as increasing the scale of projects and ensuring that public buildings can capture maximum energy savings at a reasonable cost. Part of that involves encouraging projects that can deliver deeper savings.

In one case study, a Russian hospital commissioned an EPC project to install heat controls, but separately undertook a capital improvement project to replace aging windows. Ideally, both of these upgrades would be part of the same EPC project. There are three main reasons for policymakers to aim for more complex projects: 1) comprehensive measures allow for deeper energy efficiency gains (i.e., performing whole-building analysis and retrofit will yield greater savings than achievable through individual measures); 2) after the short-payback measures are implemented, longer-payback—but still worthwhile—measures may never be undertaken; 3) public facility managers can cost effectively implement simple projects (e.g., replacing lighting), whereas hiring an ESCO brings in the expertise for more complex projects with greater savings.

To achieve deeper energy savings, ESCOs and public facilities must develop more complex projects with multiple energy conservation measures, some of which have an interactive effect. More complex projects require more detailed engineering analysis, thus greater pre-award investment from ESCOs. Such analysis is called “Investment Grade Audit” (IGA). Unless the value of contracted services is substantial, complex projects also are rarely financially feasible for ESCOs because of the transaction costs (i.e., projects need to be large or bundled).⁴ For this reason, access to third-party financing also is important.

Experience from France and Canada shows that companies find it too risky to prepare full-scale IGAs prior to contract award and projects do not go forward. Instead, more countries are finding it helpful to build flexibility into the process and allow facility managers and ESCOs to finalize energy saving measures after the contract is awarded and the ESCO has conducted an IGA. This type of process has been used in Canada, Germany, India, and the United States (Singh et al., 2010).

⁴ For the United States, we estimate the level of contracted services meriting an IGA to be about \$1 million.

Recent changes to Russian legislation suggest that policymakers are eager to find a solution that would help the EPC market succeed. Beginning January 1, 2014, agencies can conduct a two-stage tender. The first stage would focus on the projects' technical aspects, and the second stage would evaluate more detailed proposals, including financial aspects. Such tender procedures can filter out companies that are not technically competent and reduce risks for companies preparing more detailed proposals in the second stage. However, government clients should not insist that the proposed list of energy conservation measures be final before the contract is signed. ESCOs should be able to propose a revised list of measures based on the IGA results. To avoid an issue of ESCOs "over-promising" energy savings to win a contract, public facilities can set a limit on how much post-IGA estimates can deviate from the proposal. For example, U.S. government agencies specify a percentage for such variances.

Finally, various analytical tools can assist public facility managers in evaluating alternative investment options to determine if, over the life of the facility, more complex projects are feasible and cost-effective. Policymakers should invest in developing tools that would be based on factors typical of Russian facilities (see Section 4.4) to help their public facilities make better investment decisions that also can deliver more energy savings over the facility's lifetime.

Table 4. Recommendations on improving feasibility of accepting and implementing more complex projects

Recommendations for Policymakers	Recommendations for ESCOs
Encourage two-stage tendering, particularly where more complex projects are feasible. The first stage should focus on technical evaluation of proposals, which can be done through scoring and selecting candidates that meet minimum requirements.	Ensure the client is intent on conducting a two-stage tender, the first of which evaluates the technical aspects of the project.
Consider providing an independent service or agency that would evaluate the technical aspects of the project.	Select technologies you are most comfortable and confident with. Consider whether or not you have special access to any supplier.
Invest in research to develop tools that help evaluate various investment options.	In a two-stage tender, include a detailed methodology and work plan in your proposal to demonstrate a thorough approach and technical skills.
When feasible, build in mechanisms to incorporate non-energy benefits into evaluation process.	Develop the capacity to propose more complex projects with deeper savings. Emphasize non-energy benefits, such as by valuating them in monetary terms.

4.3. Obtaining third-party financing

Several ESCOs in Russia have been willing to self-finance EPC projects, allowing projects to proceed. However, ESCOs generally are unable to adequately evaluate financial risks because their primary expertise is energy savings engineering. In addition, third-party financing is important to the development and expansion of the ESCO market. Absence of third-party financing limits how many projects ESCOs can take on at any given time. During interviews, several ESCOs mentioned they could not take on new EPC projects because their assets already were "frozen" by current projects. Simultaneously, the Russian EPC market would benefit if these more experienced ESCOs could continue offering their services.

In countries with successful EPC markets, third-party financing can be arranged through a bank loan either to the government client (the ESCO still guarantees that savings are large enough to cover payments) or to the ESCO. In the United States, many ESCOs have formed partnerships with financial institutions to provide financing solutions, but government clients, in most cases, are the primary borrowers because they can access tax-exempt financing, such as bonds. When ESCOs act as the primary borrowers, financial institutions must approve project economics. In both of these cases, financial institutions want to verify that the government client can repay the debt. Therefore, financial institutions will review client credit ratings. In Russia, where few government agencies or authorities have established credit ratings, conducting detailed credit analyses of each municipal facility would be too expensive given the size of most energy efficiency projects. To attract financing at the best terms, regional authorities should offer guarantees that commit to covering delinquent payments after a reasonably short period (possibly a few months). These guarantees should be one of the most important considerations for policymakers among regional governments due to the importance of guarantees in stimulating investment and leveraging private funds.

Another challenge for the Russian EPC market is that current legislation does not allow government clients to take on financing loans for EPCs. However, ESCOs find it hard to obtain financing with reasonable interest rates and terms. It is particularly difficult to finance the project construction stage, when ESCOs have to purchase equipment and materials, and pay for installations upfront. Factoring, which allows an ESCO to sell project receivables after the project is commissioned, can alleviate this financial bottleneck. Factoring also can be done either through a bank or a dedicated fund.

Because few institutions are willing to buy receivables in Russia, policymakers can help set up a special, dedicated fund to support ESCO financing projects. For example, in 2006, a Bulgarian company established such a fund in Bulgaria. Since its establishment, the fund purchased receivables under more than 30 projects with a total value exceeding €20 million. Most of the funding (€17 million) was provided by the European Bank for Reconstruction and Development in 2008-2012. In addition, the Bulgarian government relied on assistance from other international donors, such as World Bank, to establish the Bulgarian Energy Efficiency Fund. The fund helped insure municipal energy efficiency projects, including EPCs.

Banks also can offer factoring, but they will need to protect themselves from non-payment through the government facility's excellent credit rating or, if a rating is unavailable, a financial guarantee from the regional government to cover payments (as already described). Most of the ESCOs in this analysis identified the lack of a credit rating or guarantee as the main obstacle for growing their business. Thus, providing regional (or municipal) guarantees should be a paramount consideration for policymakers. Such guarantees will stimulate investments, help leverage private funds, and ensure the best-possible terms of financing.

While adding a bank as a project stakeholder can increase the costs as they add a financing charge for their services, savvy ESCOs also would need to charge such fees to cover their risks if they assume the financial obligations. One strategy to contain costs is to prepare larger projects that spread these transaction fees over a larger baseline. In fact, one the requirements that banks or other

financiers often have is that projects must be large enough to be worthwhile. Working with larger projects allows banks (and ESCOs) to distribute their costs with an added advantage that larger projects can be more complex and allow for greater savings.

Another way legislation can support access to third-party financing is by allowing factoring and larger projects. For example, bundling projects can spread out some of the transaction costs. As noted, street lighting projects are the most popular types of EPC projects in Russia, partly because ESCOs can group street lighting systems in several locations and work with just one client: a municipality.⁵ We recommend applying a similar model to other public facilities, bundling them by type or other characteristics. Bundling also can allow ESCOs to manage their performance risks. If one facility is underperforming, the company can compensate for it through other better-performing facilities.

Table 5. Recommendations on how to improve access to third-party financing and reduce financial transaction costs.

Recommendations for Policymakers	Recommendations for ESCOs
Develop legislation that supports regional authorities in issuing financial guarantees to cover delinquent EPC debt payments.	If a municipality does not have any experience in commissioning EPCs or is new to the market, choose a street lighting project, which has only one client (municipal company), where larger project size is possible.
Allow ESCOs to bundle projects.	When bundling is not feasible, transaction costs can be reduced by developing a standard process for working with one type of public facility (e.g., schools).
Qualify ESCOs through expert review boards. Qualification should be free and have a straightforward process, supported by model Request for Qualifications documents	Partner with a financial institution by offering a flow of business at relatively low cost. This can be done by assuming some of the financing origination responsibilities or finding projects that are likely be approved by the institutions.
Establish a dedicated fund that can buy receivables from ESCOs.	
Provide financial incentives, such as tax breaks, for ESCOs obtaining third-party financing.	
To “jumpstart” EPC projects in the region, consider starting with street lighting projects.	
Other mechanisms of support include white certificates, special bank programs, government bonds and green loans.	

⁵ Another advantage to working with municipalities is that they have greater control of the municipal budget because they administer it. In contrast, budgets for municipal schools depend on allocations from municipal authorities.

4.4. Ensuring fair and cost-effective verification and measurement

Another obstacle reported by ESCOs in Russia is quantification of savings under changing conditions post-installation. In most projects, operating conditions change in ways that are not captured in contracts, requiring changes to baseline conditions and M&V methodologies. Such changes can include: medical equipment upgrades in a hospital, conversion in school type and schedule, and capital improvement projects at the time of EPC projects. Interestingly, in all cases, parties informally and amicably agreed on how to adjust baselines and methodologies, most likely understanding that the EPC model still is in “beta mode” in Russia. As the market becomes more competitive and profit margins narrow, crude calculations and informal arrangements will become more contentious, risky, and costly. Thus, it is important to have reliable and trustworthy methodologies for carrying out these adjustments, having them contractually documented.

In Russia’s case, existing regulations and the model contract establish that savings are linked to external temperature, hours of utilization, and number of occupants. However, by themselves, these official documents are not comprehensive enough to ensure accurate and situation-specific adjustments for energy savings. Public facility managers and ESCOs need additional tools to evaluate energy savings, the impact of various factors on energy savings, and the resulting financial returns.

The choice of M&V strategy to assess savings affects the allocation of risks and responsibilities and, therefore, costs. As such, it is important to choose strategies that are fair and agreed upon from the start. In the United States, this is achieved through M&V plans primarily completed post-award but before installation. To create such plans, public facility managers and ESCOs rely on procedures and guidelines detailed in a 300-page document. The guidelines define options for M&V (either retrofit isolation or whole-building analysis), consider the impact of independent variables on energy savings, establish the importance of statistical models for baselines and energy use, and describe documentation required for assuming estimated values, among other things. The guidelines are not prescriptive, but they provide options for public facility managers.

It is important to recognize that M&V can become expensive for projects. Thus, rather than aiming for the most accurate and expensive results, facility managers and ESCOs should find M&V options that are cost-effective for a given project. At the same time, the M&V methods selected should quantify savings based on measurements or documented estimates, be flexible to adjust to changing conditions, and ensure that risk and responsibilities are distributed evenly.

To assist with more cost-effective and accurate quantification of savings, the DOE maintains a database of tools for energy analysis, including tools that assist specifically with M&V. These tools allow users assess the impact of fuels, equipment, and other factors typical to facilities in the United States. These tools reduce the costs and risks to ESCOs and public facilities. International researchers have conducted many studies to understand the relationship between the number of occupants, building materials, building parameters, and weather, among other factors. Industry best practices are documented in international guidelines for M&V, such as the International Performance Measurement

and Verification Protocol (IPMVP, 2012) and American Society of Heating, Refrigerating and Air-Conditioning Engineers Guideline 14 (ASHRAE, 2013).

Russia successfully uses these standards. Volume I of IMPVP was translated into Russian and is available online. The document is also a basis for some of the Russian legislation regarding EPCs. More recently, Rosstandart drafted a national standard “Measurement and Verification of Energy Efficiency. General Provisions on Defining Energy Savings.” These standards are currently undergoing public review. These and other more specific tools based on factors typical to Russian facilities can significantly improve decision-making about potential investments, reduce expenses for ESCOs to verify savings, and offer acceptable and objective methodologies to reduce negotiation time.

In the near term, while domestic Russian building science expands, ESCOs and public facilities can simplify M&V using guaranteed savings contracts. In guaranteed savings contracts, ESCOs receive fixed payments equal to the level of savings the company guarantees. The guaranteed level typically is less than the actual level due to technical risk (if annual verification shows the level of savings is lower than the guaranteed level, the ESCO is responsible for the difference). Thus, under guaranteed savings, ESCOs only need to prove their installations provided the guaranteed level of savings. In contrast, under shared savings contracts, the ESCO and customer must precisely quantify and agree on the savings to accurately calculate payments.

Table 6. Recommendations on how to make M&V of savings less problematic.

Recommendations for Policymakers	Recommendations for ESCOs
As Russia has done, use industry best practices, such as IPMVP and ASHRAE Guideline 14, until better domestic research is developed.	Negotiate a guaranteed savings contract.
Encourage public EPC projects to have M&V plans.	Before installation, consider suggesting an agreement on an M&V plan that uses IPMVP and ASHRAE Guideline 14.
Invest in research to develop models for investment decision-making and M&V in Russian facilities.	
Encourage guaranteed savings contracts.	

5. Conclusions

Russia’s experimentation with the ESCO model offers lessons for policymakers and experts working to launch the EPC mechanism in other countries. With energy prices increasing and large energy savings potential, Russian policymakers have shown strong support for the EPC mechanism and developed the legislative framework that supports improving energy efficiency in public facilities through the EPC mechanism. As a result, the Russian EPC market recently made great strides forward with around 50 ESCOs operating in the country and about 150 commissioned EPCs in the public facilities.

Further improvements in public procurement policy and experimentation by ESCOs will help the market move forward and tackle some of the most common challenges encountered in this sector. Based on feedback from ESCOs in Russia, these challenges include risks and costs associated with preparing tender documentation and proposals, proposing more complex projects, financing projects

through a third party, and quantifying post-installation savings. For example, creating conditions for third-party financing will help ESCOs focus on using their expertise and improve their ability to take on more projects. More bids will result in additional competitive markets, more complex projects, and greater savings. Focusing Russian building science on energy efficiency topics that support implementation of EPCs in Russia also is an important part of the solution needed to generate a stronger ESCO market.

The current legislative framework launched EPCs in Russia. However, as the market evolves and becomes more competitive, policymakers need to adapt their approach. These findings and recommendations aim to offer insights for policymakers, facility managers, and ESCOs on expanding the use of the EPC mechanism to generate energy savings in public facilities.

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